Learner Perceptions of the Motivating Role of Learning Technology in Education

by

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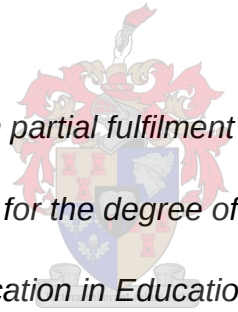

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DECLARATION

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Casey Anley	23 February 2015
Name	**Date**

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ABSTRACT

Twenty-first century youth have been privy to regular exposure to digital technology, both in their schools and in the home, which has resulted in a change of both lifestyle and educational practice from that enjoyed by prior generations. Parallel to the technology market trajectory that has arguably influenced the psychological and psycho-social development of contemporary youth is the burgeoning industry of learning technology. Integration of such technology into South African schools is relatively in its infancy when compared to global initiatives, and has sparked debate as to the place of technology within education in a country fraught with divided resources. In consideration of the influence of technology on education, research which investigates the motivating role of technology upon learning, particularly from the perspective of the learners themselves, is amiss. This study aimed to discover the extent to which technology tools used in education motivate the twenty-first century South African learner to learn, and whether the use of such technology would create a more engaging, relevant educational environment.

In order to investigate the topic, exploratory qualitative research as underpinned by the constructivist paradigm and within a social constructivist theoretical framework was conducted as a case study. Purposive sampling was employed to select Grade 11 learners in order to gain their perspectives and those of their teachers who bear witness to their learning at one private co-educational high school in the Western Cape. Qualitative content analysis was utilised to interpret the data collected from a semi-structured focus group interview conducted with eight learners, as well as from learner and teacher questionnaires which provided valuable contextualisation for the focus group interview.

The research findings from the study indicated that the learner participants could identify the role of intrinsic motivation to learn, and demonstrated awareness of the factors that contributed to the facilitation thereof, of which learning technology played a prominent role. The participants noted the importance of the complementary role of learning technology; a means to an end and not an end in itself. Important considerations were highlighted, such as the potential for distraction, personal

learning preferences, and conceptualisations of learning required for technology to be successfully integrated into the twenty-first century learning environment.

Keywords: Motivation, Learning, Learning Technology, Social Constructivist Theory

OPSOMMING

In teenstelling met vorige generasies word die jeug van die 21ste eeu gereeld blootgestel aan digitale tegnologie, tuis sowel as in hul skole, wat ‘n verandering in beide hul leefstyl en die onderwyspraktyk tot gevolg het. Parallel aan die baan van ontwikkeling van die tegnologiemarkte, wat ’n betwisbare invloed het op die sielkundige en psigososiale ontwikkeling van die hedendaagse jeug het, is die ontluikende industrie van leertegnologie. Die integrasie van sulke tegnologie in Suid-Afrikaanse skole is nog in sy kinderskoene as dit vergelyk word met globale inisiatiewe en dit het debat oor die plek van tegnologie in ‘n land met oneweredig verdeelde hulpbronne ontlok. As die invloed van tegnologie op opvoeding in ag geneem word, is navorsing wat die motiverende effek van tegnologie op leer ondersoek, veral vanuit die perpektief van die leerders self, beperk. Die doel van hierdie studie was om vas te stel tot watter mate tegnologiese hulpmiddels in die onderwys die Suid-Afrikaanse leerder van die 21ste eeu motiveer om te leer en of die gebruik van sulke tegnologie ’n meer deelnemende, relevante onderwysomgewing sal skep.

Hierdie verkennende, kwalitatiewe gevallestudie binne die konstruktivistiese paradigma het sosiale konstruktivisme as die onderliggende teoretiese raamwerk gehad. Doelbewuste steekproefneming is uitgevoer om die Graad 11 leerders uit 'n enkele private hoërskool in die Wes-Kaap te selekteer om sodoende hul perspektiewe asook dié van hul onderwysers, wat van hul leerproses kan getuig, te bekom. Data is deur middel van ’n semi-gestruktureerde fokusgroeponderhoud asook vraelyste aan beide die leerders en onderwysers ingesamel, wat waardevolle kontekstualisering vir die fokusgroeponderhoud voorsien het. Die ontleding van die navorsingsdata is met behulp van kwalitatiewe inhoudsanalise uitgevoer.

Die bevindings van hierdie studie het aangedui dat die leerderdeelnemers die rol van intrinsieke motivering om te leer kon identifiseer en hulle het ’n bewustheid getoon vir die faktore wat dit bevorder. Leertegnologie het ’n prominente rol gespeel in hierdie faktore. Die deelnemers het gewys op die belangrike komplementêre rol van leertegnologie; ’n weg tot ’n doel en nie die doel self nie. Belangrike oorwegings is uitgelig, soos die potensiaal vir aandagafleiding en ook persoonlike leervoorkeure en

konseptualiserings van leer benodig vir suksesvolle integrasie van tegnologie in die 21ste eeuse leeromgewing.

Sleutelwoorde: Motivering, Leer, Leertegnologie, Sosiaal-konstruktivistiese Teorie

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LIST OF ABBREVIATIONS

DoE	Department of Education
ERG	Existence Relatedness Growth
ICT	Information and Communications Technology
ISTE	International Society for Technology in Education
MKO	More Knowledgeable Other
NEIMS	National Education Infrastructure Management Systems
NEPAD	New Partnership for Africa's Development
PLATO	Programmed Logic for Automatic Teaching Operations
RIA	Research ICT Africa
StatsSA	Statistics South Africa
ZPD	Zone of Proximal Development

CHAPTER 1

CONTEXTUALISATION AND BACKGROUND INFORMATION TO THE RESEARCH STUDY

1.1 INTRODUCTION

In a world with over seven billion people, there is pressure for contemporary adolescents to map out their future success before they have even completed school, which can be especially problematic if the schooling system does not engender and maintain interest and engagement long enough to keep learners in schools. Boredom in education has reached epidemic levels, and is even the focus of a documentary released in 2012 entitled *Boredom* that sets out to critique the phenomenon within school systems around the globe. In order to investigate what drives learner engagement and motivation to learn, it is interesting to explore the oft overlooked learners' perceptions into their own learning, taking into consideration their requirements for modernised, personally relevant curricula and presentation thereof. This study aims to discover the extent to which learning technology (as defined in Section 1.11.2) used in education motivates the twenty-first century South African learner, and whether the use of such technology would create a more engaging, relevant educational environment.

Learners currently in classrooms are not the same as they were fifty, twenty or even ten years ago. Children today are described as *digital natives* (Palfrey & Gasser, 2008, p.1); born into a world of technology, they acquire the techno-language (more a cultural indicator than purely jargon), access internet searches at the touch of a button or voice command, and enjoy entertainment provided by worldwide collaborators (see Section 1.11.3 for a full description of this term). Teachers feel the pressure to bypass the plethora of distractions (both within and beyond the immediate control delineated by the school boundaries) to motivate their learners to focus and achieve (Turnure Pickens, 2007). Whilst initially attempting to compete

against technology for learners' attention, teachers are starting to embrace its use in the classroom to connect with and motivate their learners (Palfrey & Gasser, 2008).

This chapter will provide the reader with the objectives, background, and motivation for the research. Secondly, it will briefly describe the theoretical framework underpinning the study and state the research problem and research questions. It also includes an introductory description of the research plan, data analysis and ethical considerations that will guide this research. Lastly, relevant concepts are clarified and a summary of the remainder of the chapters in this thesis will be provided.

1.2 BACKGROUND AND CONTEXTUALISATION

Many teachers indicate that contemporary learners exhibit problem behaviours in class such as not paying attention, talking out of turn, and disrespecting their teachers and each other (Sun & Shek, 2012). A proactive reaction to this phenomenon lies in the exploration of the underlying reasons for such behaviour. The Center for Mental Health in Schools (2008) indicated that learners disengage from learning processes when the experience is no longer personally meaningful or worth their effort. Instead of punishing learners, which has the potential to cause them to disengage even further, it is imperative to investigate what engages the twenty-first century learner.

As a teacher, the researcher began to notice the interest that learners began to take in lesson content when technology was used in the classroom. Learners were eager to help set up the equipment and stayed after class to find out where they could access the videos used in the lesson or how to further explore a concept. Learners completing individual projects showed more engagement with the material content when technology was used to present the project to the teacher and class, a phenomenon consistent with the findings of Condie, Munro, Seagraves and Kenesson (2007) regarding the use of *Information and Communications Technology (ICT)* in learning.

Prensky (2001) declares that the educational system designed for yesterday's society is no longer applicable or attractive to the needs of today's learners. As a result of a different type of exposure to early learning afforded by technology,

contemporary learners process information in a different manner, which renders many of the instructional practices of long-established teachers outdated and ineffective (Prensky, 2001). Also, traditional curricula designed to prepare learners for the workplace are no longer applicable, as new career spheres require innovative skill sets (Palfrey & Gasser, 2008).

Education practices which harness modern technology have showed favour with the modern learner, who from a young age, according to Prensky (2001), has become accustomed to working with technological tools. The extent to which technology has been embraced within the modern classroom depends on various factors such as the availability and accessibility of technology at the classroom, school, district and national level (Muchie & Baskaran, 2006; Isaacs, 2007; Vandeyar, 2013), teacher training and willingness to explore new avenues of instruction and learning (Vandeyar, 2013; Mentz & Mentz, 2003), as well as learner needs (Aslan & Reigeluth, 2011; Tavenner, 2012). The influence of the internet in education, implementation models such as blended learning, as well as the development of learner- and teacher-friendly devices afford the opportunity for education to speak the language of the digital native (Palfrey & Gasser, 2008; Aslan & Reigeluth, 2011; Staker & Horn, 2011; Valiente, 2010). Learners gain autonomy over their learning as knowledge construction is facilitated by both teachers and the technology itself, in a constructivist learning process (Palmer, 2005; Coetzee, van Niekerk & Wydeman, 2008). When education taps into the tools that contemporary adolescents use in their daily milieu, school is configured into a more pertinent, motivating and enjoyable experience, within a constructivist process (Palfrey & Gasser, 2008; Niehaus, 2012; Brewer & Harrison, 2013). Through such constructions of the role of technology in education, it is also possible to consider how learning and motivation theories play a role in a constructivist conceptualisation of the contemporary adolescent learning process.

1.3 RESEARCH PROBLEM AND AIMS

Many twenty-first century children grow up with regular exposure to technology, both in their schools and in the home (Jukes & Dosaj, 2006; Palfrey & Gasser, 2008). This has resulted in a shift in lifestyle from that enjoyed by prior generations, as a result of the various modes of technology from which to choose to engage, the adapted

needs of the modern student and future worker, as well as the vast expanse of information afforded at the fingertips of eager learners (Geer & Sweeney, 2012). An understanding of the new-age learner as a digital native is imperative within educational transformation (Palfrey & Gasser, 2008). Utilising a social constructivist theoretical framework, the researcher wishes to illustrate the social nature of contemporary adolescent learning. Through consideration of motivation theory combined with an understanding of the lived experiences of how the contemporary adolescent conceptualises optimal learning, the researcher wishes to exemplify the need for an educational paradigm shift, in order to make it more accessible and relevant for learners of the present and future generations.

Geer and Sweeney (2012) point out the irony in the fact that although education transformation has focused on developing learners' critical thinking and student voice, it is these same voices that are not considered in the process of such transformation. It is policy makers, principals and teachers who design and adapt curricula for learners, desperate to engage and inspire them, but the learners themselves are not consulted regarding their conceptualisations of optimal learning environments required for autonomous learning. By listening to the needs of learners, the researcher proposes that learning experiences can become more enticing to the modern learner, whereby learners' own conceptualisations regarding their motivators are incorporated into their learning experience (National Research Council, 2004; Mylläri, Kynäslahti, Vesterinen, Vahtivuori-Hänninen, Lipponen & Tella, 2011). As such, the voices of the learner participants play a key role in this research.

South African education, however, has been slow to warm to such a concept. To provide relevant education that is on par with the rest of the global arena, it is imperative that all South African schools begin to deliberate the adoption of learning technology into its classrooms, or be left behind in a trail of electronic dust. The implementation of learning technology into education has largely been defined to primary schools and specific learning areas, especially within Mathematics and Physical Science (Wilson, 2013; Rice, 2012), with little focus on the extent to which technology affects learners' interest in and subsequent engagement with information presented at school. What is available regarding motivation in the classroom is largely outdated, pertains to the first world education systems, and focuses on

teachers' perceptions of what motivates learners, thus overlooking learners' perspectives on their experiences with technology in the classrooms (Kinzie & Sullivan, 1989; Moen & Doyle, 1978; Brooks & Shell, 2006; Hancock, 2002; Pajares, 2001; Stefl-Mabry, Radlick & Doane, 2010; Mylläri et al., 2011).

Although the transferability of the results are restricted due to the limited scope of the study, the information obtained in this research has the potential to inform curricula, school budgets, learning technology integration into the classroom as well as teacher training. Such considerations have the potential to transform teaching pedagogy, so as to align education with that of first world countries and to provide the school experience that speaks to contemporary learners within the South African context.

1.4 RESEARCH QUESTIONS

The research is primarily guided by the following question:

> What are learner perceptions of the motivating role of learning technology in education?

The primary aim of this study is to explore the perceptions of learners regarding the place of learning technology in education within a technologically-rich high school in the Western Cape, South Africa, and how such tools motivate them to engage with their education. More specifically, answers were sought for the following secondary questions:

1. What are learners' conceptualisations of the role of motivation for optimal learning?

2. What are learners' conceptualisations and experiences of the role of technology, especially when used within the classroom?

3. What influence do learners' perceive technology to have on their motivation to learn?

4. What are teachers' conceptualisations and experiences with regard to the role of technology in motivating learning?

5. How do teachers' perceptions and experience of technology influence learners' conceptualisation of technology in education?

1.5 RESEARCH PARADIGM

Paradigms are developed as a series of “assumptions” made about knowledge and knowledge generation, and the legitimacy of such assumptions against a formulated worldview (Terre Blanche & Durrheim, 1999, p. 5), or put more simply, are “model[s] or framework[s] through which to observe and understand” (Babbie, 2010, p. 33). In any such stipulated worldview, there are three dimensions that govern research. Ontology refers to the conceptualisation of reality and how it is constructed; epistemology dictates the nature of the liaison between the researcher and reality and how understandings of the world are moulded within the consideration of such a liaison, whilst methodology elucidates the manner in which the researcher may utilise certain tools in the journey to uncover new knowledge (Hammond & Wellington, 2013).

Within the constructivist paradigm, the researcher acknowledges and embraces the understanding that there is an inherent subjectivity involved when working with human beings. As such, the researcher has a duty to explore the subjective conceptualisations of reality that citizens of a particular social context have constructed by engaging in, through the community eye, the “lived experiences” of the people (Lincoln, Lynham & Guba, 2011, p. 106; Williamson, 2006). As the term suggests, constructivist paradigm proponents believe that reality does not exist independent of human existence, but rather that it is constructed through multiple experiences and interactions within society (Lichtman, 2013). As a result, it is possible to consider a collective epistemology that occurs in social interaction, providing room for a social constructivist theoretical framework to explore the social phenomenon of communal reality construction (Lodico, Spaulding & Voegtle, 2010).

Considering such epistemological rationalisation for a social constructivist reading of this study, it was decided to utilise focus group interviewing as well as questionnaires to collect data and provide contextualisation for the research study. Such a methodology and design were chosen to provide participants with a wide platform to demonstrate their lived experiences of their own learning. In order to honour the understanding that the learners themselves construct their own lived realities, the constructivist paradigm provided the optimal support for investigation in this particular study, and will be discussed in more detail in Section 3.4.1.

1.6 RESEARCH DESIGN

According to Hesse-Biber and Leavy (2011), qualitative research seeks to discover "the social meaning people attribute to their experiences, circumstances and situations..." (p. 4). This study utilised qualitative research so as to speak to the constructivist paradigm, fully harnessing the participants' lived experiences regarding the place of technology as a motivator in education, as well as the role of social interaction in this conceptualisation as directed by social constructivist theory. Considering the nature of qualitative research, a case study research design for the bounded system was chosen as it provides acknowledgement of the particular research context, study aims, methods and overarching research paradigm of this particular research study. The reader is directed to Section 3.4.2.1 for a nuanced discussion of such rationalisation.

1.7 RESEARCH METHODOLOGY

In this study, the participants' experiences are held in the highest regard as informed by the constructivist paradigm, so it is only fitting that the wide range of potential participant conceptualisations are given due consideration. Case study research enables the close observation of a particular phenomenon within one example of a natural setting (Babbie, 2010; Baxter & Jack, 2008) from the perspectives of a variety of stakeholders (Hesse-Biber & Leavy, 2011). The aim of the research was to explore the possible influence that technology held within one bounded system, namely one Grade 11 class at one school in the Western Cape. By analysing the data that emerges from the examination of one bounded system (as described in Section 3.4.2.1), tentative discussions regarding the validity of the data for other systems can be investigated (Flyvbjerg, 2011).

1.7.1 Context of the study

The study was conducted at a private high school within what could be argued as an affluent region of Cape Town, Western Cape. This school was selected for the fervour with which the school approaches the use of technology within education. Such enthusiasm is expressed in the implementation of a pilot project for the school year of 2014 in order to assess the potential for utilising technology in the classroom

in order to support learning. Further contextualisation of the school setting is delineated in Section 3.5.2.1.

1.7.2 The role of the researcher

Merriam (2009) considers the position of a researcher as falling on a continuum between “complete participant” (p. 124) and “complete observer” (p. 125). This is a decision that the researcher must contemplate in the research proposal phase, and depends on the research aims, paradigm and nature of data required.

The aim of this research study was to honour the learners’ voices in their interpretations of the role that technology plays in learning motivation. Denscombe (2007) warns of the reflection required to determine how much of the “researcher’s self” becomes embedded in the process and data analysis (p. 69), which could have implications on the ethical principles of confirmability and validity. As this field of research is a personal passion for the researcher, it was essential to reflect on the potential for stepping out of the “researcher” role to join the participants in their unpacking of the research questions. The reflection thereof is discussed in more detail in Section 3.5.2.2.

1.8 RESEARCH METHODS

1.8.1 Selection of participants and selection criteria

The research participants consulted in this study consisted of one class of Grade 11 learners and their teachers from a high school situated in a southern suburb of Cape Town, Western Cape. Although the focus falls on learners’ perspectives of the role of technology on learning motivation, their teachers (as witnesses to their learners’ technological engagement) were recruited to share their experiences and conceptualisations of the influence of such technological tools on learning.

The learners and teachers were selected using purposive, non-probability sampling, whereby participants are chosen for their experience in the area of research interest (Denscombe, 2007). The decision was made to approach a Grade 11 class whose teachers, owing to the nature of the learning areas studied by the learners, had experience in using technology in their presentation of learning content. By virtue of learning within the same learning area combination from Grade 8 to Grade 11, the

learners could provide a rich description of their experiences. The selection criteria for participants were that learners were a part of the chosen Grade 11 class and teachers had taught the learners of this particular class. For more specific information regarding participant selection, the reader is referred to Section 3.5.

1.8.2 Data collection methods

Hesse-Biber and Leavy (2011) explain that "[f]or many thousands of years, humans have relied on a variety of methods to understand their social world," (p. 31) and so in the same vein, it is important to tap into the potential of various methods in order to honour the voices of research participants.

The methods used to gather data in this study were focus group interviewing and the administration of questionnaires. Two questionnaires were designed for the learner and teacher participants respectively. The purpose of the questionnaires designed for the learner participants was to engage in an exploration of learners considerations of technology, as well as to highlight those salient members who may provide rich data to be considered for the focus groups. The questionnaires to be completed by teachers were designed so as to gain insight into their considerations of the place of technology in the motivation of their learners. This provided richer understanding of the context within which the learner participants conceptualised their learning.

Following the data gathered from the learners' questionnaires, the researcher randomly selected eight learners from this sample for a focus group interview. Such a decision aimed to foster a comfortable, intimate environment that provided enough opportunity for all participants to share their views, to capture the socialised communication regarding technology, and to gain an understanding of the group dynamic within the bounded system (Lewis, 2003; Lodico et al., 2010). The constructivist researcher wishes, according to Gibson and Riley (2010), to gain the inside perspectives of participants' lived experiences. In order to meet the qualitative aim to conduct research in as natural a setting as possible, focus groups were selected as they have shown to "dilute the researcher's influence" (p. 62), and encourage participants to interact more freely as they would in a regular setting. The social interaction afforded by focus groups also provides valuable insight into the social construction of participants' experiences (Gibson & Riley, 2010), which is

helpful considering the social constructivist theory used to frame this study. The decisions made in order to utilise such data collection instruments are delineated in Section 3.5.3.

1.8.3 Pilot study and data collection process

Both the focus group interview guide and questionnaires were reviewed by the researcher prior to the administration of the questionnaires and focus group interview. Such a process afforded the researcher the opportunity to refine and adjust the presentation of various questions, remove potential ambiguity and ensure that the data obtained would be able to adequately address the research questions.

The learner and teacher questionnaires were administered on the same day, which helped to inform further refinement of the focus group interview guide. The focus group interview took place within a secluded classroom at a time convenient for the learner participants to attend. Voice recording equipment was used to record the focus group, which lasted approximately 45 minutes. Further description of the data collection process is provided in Section 3.6.

1.8.4. Data analysis

Babbie (2010) refers to qualitative data analysis as “the nonnumerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships” (p. 394). Interpretive analysis is particularly interested in examining the personal meanings that people attach to experiences, and it is through what Geertz (as cited in Ponterotto, 2006) originally called *thick descriptions* of research participants’ experiences (the detailed descriptions of the experience and essence of a phenomenon being studied) that the research reveals as true a sense as possible of how the research topic is interpreted.

The focus group was transcribed by an independent scribe employed to assist in the transcription, and together with questionnaire information used to provide context , was analysed by the researcher using qualitative content analysis, the goal of which, according to Mayring (2004), is “the systemic examination of communicative material” (p. 266). In order to establish patterns and themes systematically, an open coding system was used to delineate and categorise the raw data. According to

Babbie (2010), “during open coding, data are broken down into discrete parts, closely examined, and compared for similarities and differences” (p. 427). This process is described in detail in Section 3.8.

1.9 DATA VERIFICATION

In order for research to be meaningful, it is imperative that one can trust the claims, methodology and conclusions stated; that the participants’ voices are accurately portrayed and authentic conclusions drawn. The yardstick used to assess this level of trust is provided by Lincoln and Guba’s considerations of credibility, dependability, confirmability and transferability (1985).

Credibility refers to the level of accuracy with which the researcher has depicted the experiences of the research participants (Lodico et al., 2010). By establishing rapport with participants, member checking and inviting participants to review transcripts for truthful accounts of events, it is possible to increase the credibility of research (Shenton, 2004; Lodico et al., 2010). The second criterion used to assess trustworthiness is **dependability**, which refers to the level of reliability that the research affords, that is, the certainty with which one could claim that the measurement would produce the same results if the study was replicated (Babbie, 2010). Thirdly, **confirmability** refers to the extent to which the research results accurately reflect the participants’ experiences (Shenton, 2004). Lastly, it is imperative to consider the **transferability** of research, which refers to the extent to which research findings can be applied to similar contexts (Merriam, 2009). The consideration of each of these threats to trustworthiness is described in detail in Section 3.7.

1.10 ETHICAL CONCERNS

Researchers are guided by a set of principles and codes when they endeavour to conduct research that involves human subject participation (Hammond & Wellington, 2013). By engaging in behavioural science research, researchers are committed to protecting the integrity of the field. Researchers practice under the guidance of their Research Ethical Committee, to which they submit a proposal of their proposed research study for ethical review (Lodico et al., 2010). Wassenaar (2006) maintains that, “if competently conducted, [ethical reviews] can add value to the proposed

study and prevent and reduce harm to the participants and adverse consequences for the researcher" (p. 66). Ethical clearance was sought from the Ethical Committee of Research Development at Stellenbosch University so as to ensure that the chances of unethical practices were managed. A copy of the ethical clearance obtained can be found in Addendum B.

Stangor (2014) maintains that participants have a right to enter research fully understanding the undertaking to which they have agreed; this includes an understanding of the nature of the research, including the duration and expectations of them, potential risks and benefits, and the right to decline or withdraw participation in the research. For a detailed description of how participants' rights to research involvement were managed in this study, the reader is directed to Section 3.8.

1.11 KEY TERMS

1.11.1 Motivation

Motivation refers to a person's level of attention that is piqued by personal interest, which is then sustained over a period of time, and can direct action to attain a particular goal (Turnure Pickens, 2007). This inner level of attention that is generated can be as a result of internal psychological factors, or those inspired by efforts external to the person; called intrinsic and extrinsic motivation respectively (Crosby Bergin & Bergin, 2014). These concepts will be deconstructed and analysed in Section 2.3.

1.11.2 Learning technology

In consideration of the etymology of the word, *techne* refers to an art or skill, whilst *logia* refers to the manipulation of language, which indicates the conceptualisations that can be made when practicing a skill. Technology refers to the practice, means and consequences thereof of gathering information (Januszewski & Molenda, 2008). It is a concept that has experienced exponential innovation with the invention of digital technology, and permeates almost every aspect of modern day life, but it is the technology used in the educational setting that has captured the attention of the researcher. As such, the term *learning technology* is specifically employed in this research to describe the collection of tools used within the education environment to

support and enhance teaching, learning and assessment (Association for Learning Technology, 2010).

The use of three categories of technology (briefly denoted below) are explored in the data collection instruments (see Addenda F and G), and as such, it is important to deconstruct such terms to specify the scope of this research. Within this research study, the term technology will be used to refer to all three categories of technology, unless otherwise stated.

1.11.2.1 Internet

The *internet* refers to a digital mega-network that connects billions of users to globally shared information. Users access the internet to communicate with each other, share files and access remote cyber services. Teachers have used the internet for some time to gather resources, but are now affording their learners with the opportunity to venture into digital explorations to uncover resources of their own (Berk, 2010).

1.11.2.2 Hardware

In this study, the use of the term *hardware* refers to any of the physical technology components used in the classroom. Typically, the term is used to denote the various physical components that are attached to a computer (for example, the computer screen, mouse and keyboard) (Gookin, 2011), but in this study, the term is extended to include other forms of learning technology used for teaching and learning in the classroom. Examples of such are computers, laptops, tablet computers, mobile phones, projectors, smart boards and cameras. Further descriptions of certain tools are discussed as they appear in the text.

1.11.2.3 Software

In this context, *software* refers to the non-visible components of a computer system, that is, the applications or programmes that are installed onto the computer system to assist the user to perform certain functions, such as creating spreadsheets, accessing the internet and playing media files (Gookin, 2011).

1.11.3 Digital native

Coined by Prensky in 2001, this term has been used to describe a person born into the era of digital technology innovation, for whom the ease with which he or she navigates digital devices and surfs the internet is synonymous with speaking a home language (Palfrey & Gasser, 2008; Prensky, 2001; Helsper & Eynon, 2010). They are hence (digital) natives of the world of digital technology. See Section 2.4.2.1 for a more nuanced discussion and critique of this term.

1.12 CONCLUSION

This chapter provided a description and contextualisation for the study, introduced the questions to be addressed in order for the research aims to be met, and delineated the methodology and methods used in the study. Furthermore, it introduced the ethical considerations necessary for research to take place, and highlighted the role of the researcher. In conclusion, working definitions for key terms used in this chapter and those to follow were provided.

1.13 OVERVIEW OF CHAPTERS

Chapter 1 serves as an introduction and broad outline of the thesis.

Chapter 2 describes the theoretical framework of the study as well as a review of the available literature and research findings on the topic of the role of technology in motivating learning.

Chapter 3 provides a detailed discussed regarding the research paradigm, research design and methodology, as well as research methods used in this study.

Chapter 4 presents the findings of the research study.

Chapter 5 concludes the thesis with a discussion of the research findings, and the implications thereof.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter serves as a review of the most relevant literature around the topics of motivation, learning technology, and the adolescent who experiences such phenomena in learning. Ridley (2008) maintains that a literature review refers both to the process and product of reviewing literature. The ongoing process of observing research motivates the researcher to initiate the study, identify research gaps, phrase coherent research questions, delineate the theoretical framework to guide the research, choose methodology and finally, direct the choice of data analysis. The final literature review product offers the researcher the opportunity to showcase the connection and meaning-making of contemporary research. According to Ridley (2008), it is the literature review that ultimately "serves as the driving force and jumping-off point for your own investigation" (p. 2).

This chapter begins with an exploration into the theoretical frameworks as well as the implications thereof for this research study. Literature on motivation and motivation theories is explored. This is followed by an in-depth discussion of the contemporary adolescent. Literature on learning technology within the South African context concludes the literature review.

In consideration of the rapid innovation in learning technology (Berk, 2010), the researcher wished to peruse a wide variety of literature continuously throughout this research study, so as to engage with the most contemporary perspectives of learning technology. As such, the decision was made to explore digital forums that are not traditionally consulted in academic research, but are necessary to capture contemporary movements in the field. Such forums include social media practices such as web logs (blogs), written by researchers, teachers and learners alike.

Fenby-Hulse (2012), research officer at the University of Brighton, England, described blogs as “open narratives” that lend themselves to constant adaptation. He discussed the possibility of the circulation of information offered to a wider audience as well as the potential of blogging for non-academics to engage in topics that would not otherwise be open to them if contained in journals, indicating that “the idea of an open and ever-expanding narrative is something that I believe could be of great benefit to academic publishers” (Fenby-Hulse, 2012). Rothman (2014) indicated that open forums such as blogging help to expose the potential for knowledge collaboration to a wider audience, challenging the place of academics as the only contributors worthy of critical engagement. Although Rothman (2014) warns about the threat of compromised validity of the information contained in many layman blog posts, it is interesting to note that a form of information review does seem to take place in the form of comments, challenges and critiques left by blog readers, which helps to keep bloggers accountable for their postings. Faulkes (2014) notes that when consulted in research, social media can be considered to be “the biggest research conference in the world” (p. 260).

2.2 THEORETICAL FRAMEWORK

Social constructivist theory was chosen as the most appropriate for this research study as it affords the necessary respect and pays homage to the perspectives of the learner participants in the study. Land, Hannafin and Oliver (2012) explain that teaching experienced a paradigm shift in thinking about learning during the 1990s. Constructivism represented more social, learner-centred learning than traditional chalk-and-talk theories of information transmission of earlier eras (Land et al., 2012). Social constructivist theory adds a social component to learning, which offers valuable insight into the learning that occurs in the classroom setting, as well as outside of the school boundaries (Kim, 2001).

Lev Vygotsky was one of the leading contributors to the theory of social constructivism. According to this theory of learning, reality, knowledge and meaning are constructed through social and cultural interaction (Kim, 2001). Vygotsky maintained that social learning precedes cognitive development; that is, learning occurs through social interaction with others and does not depend on particular cognitive developments to have been accomplished before learning could take

place, a point of difference that sets Vygotsky's conceptualisations apart from those of Jean Piaget in the cognitive constructivist theory of learning (Gould, 2012; Crosby Bergin & Bergin, 2014). Vygotsky maintained that, if given the opportunity to actively explore learning and with the mediation of other role players, learners are able to construct new understanding by building onto and reorganising previously constructed and assimilated knowledge, skills and understanding within a specific learning frame referred to as the *zone of proximal development* (ZPD) (Gould, 2012, p. 117; National Research Council, 2004; Newman & Newman, 2008). According to Vygotsky (1978), the ZPD is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (p. 86). In other words, the learner will reach a ceiling of understanding when learning without assistance, and in order to push beyond this conceptualisation ceiling, interaction with *more knowledgeable others* (MKOs) is fundamental for personal learning development (Gould, 2012, p. 123). The MKO refers to any source of knowledge that possesses more understanding and/or experience with regards to the topic being learnt, and which can provide the facilitation necessary for the learner to renegotiate his or her own ZPD. The necessary support is referred to as *scaffolding*, which involves the deconstruction of topics into smaller manageable concepts, as well as the individual guidance required to master such concepts (Crosby Bergin & Bergin, 2014, p. 124). In a study conducted with 45 Kenyan learners to determine the learning and engaging influence of technology, Lugalia, Johnston-Wilder and Goodall (2013) concluded that the computer can also play the MKO role, which has interesting implications for this study. If learners could utilise technology to scaffold their learning within the classroom, but especially outside the classroom when the teacher is not at hand to answer questions, could the potential for autonomous learning be enhanced? This study aimed to investigate the use of technology for learning both within and outside the classroom, and explore learners' perspectives of the supportive role that technology plays to aid their learning.

The implication of the social constructivist theory of learning in general is that learning is a social and cultural construct (Newman & Newman, 2008), and thus the

techniques used to enable and encourage optimal learning must consider the following implications in summary:

1. Learning is a social and cultural endeavour, and it is through interactions with a learning community that knowledge and understanding is constructed.

2. Previous knowledge is reorganised and assimilated to enable progressive learning.

3. A learner requires interaction with MKOs to break through his or her personal ceiling of understanding (ZPD) that restricts independent learning.

See Figure 2.1 below for a schematic representation of the ZPD.

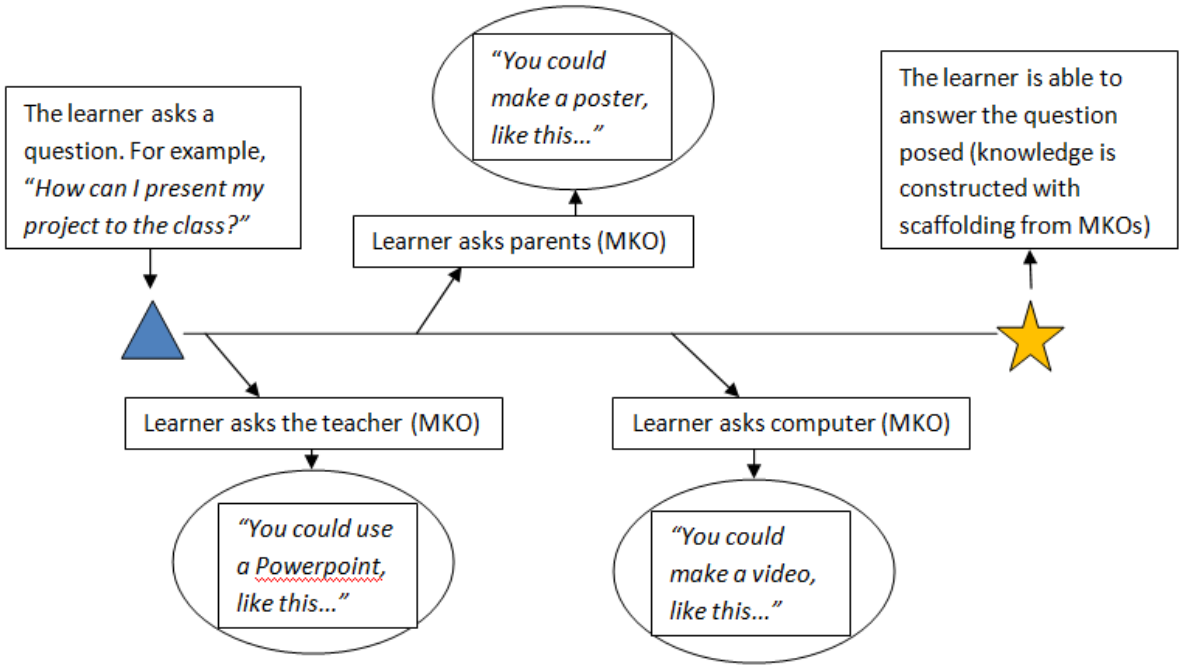

Figure 2.1: Schematic representation of Vygotsky's theory of ZPD (adapted from Galloway, 2001, and Newman & Newman, 2008)

2.3 MOTIVATION

The word 'motivation' hails from the Latin *movere* which means "to move" (Turnure Pickens, 2007, p.11), which indicates that motivation is not a passive activity – it

requires inspiration that is personally meaningful to instigate attention. How the inspiration comes to be personally meaningful is the focus of this section. Wentzel and Brophy (2014) differentiate between three constructs of motivation; motives, goals and strategies. *Motives* refer to the "general needs or desires that energize people to initiate purposeful action sequences" (p. 4); *goals* consider "the immediate objective of action sequences" (p. 5), and *strategies* delineate "the methods used to achieve goals and thus to satisfy motives" (p.5).

The term motivation is commonly used to refer to those biological processes that stimulate action to drive behaviour over an extended period of time (Turnure Pickens, 2007; Daw & Shohamy, 2008), but it is important to consider the learner in his or her learning context to understand how these processes are influenced by the social context.

2.3.1 Motivation theories

According to Öztürk (2012), motivation theories are directed to understand human behaviour, what precipitates the behaviour and how long it took the individual to begin to behave so, how long he or she will continue to behave in this way, and what thoughts or ideas are taking place when the activity is conducted. It is imperative to look at motivation from an integrated, comprehensive viewpoint to fully understand how it may affect individual learners in their various contexts (Turnure Pickens, 2007).

There are many theories of motivation, with competing conceptualisations of how motivation is manifested. In order to negotiate the superfluity of such theories, Weiner (2013) has categorised theories of motivation into those of need reduction, expectancy-value, and mastery and growth. Need reduction theories of motivation refer to the drive that people have to satisfy personal needs, and examples of such include the psychoanalytic, hierarchy of needs, two-factor, acquired needs, existence relatedness growth (ERG) and drive theories of motivation (Weiner, 2013). Expectancy-value theories maintain that individual meaning is attached to rewards, and behaviour is driven from the expectation or possibility of realising the reward (Weiner, 2013). Examples of such include the theories of reinforcement, goal-setting, expectancy, and equity (Weiner, 2013). Mastery and growth conceptualisations of motivation presuppose that behaviours are not solely driven by the hedonistic pursuit

of pleasure or avoidance of pain, but also in understanding the relationship between the self and the environment (Weiner, 2013). As such, conceptualisations of motivation which consider the connection of personal and social motivators of learning proved attractive to the researcher as they speak to both the constructivist paradigm and social constructivist theoretical framework of this research.

2.3.2 Extrinsic and intrinsic motivation

No discussion on motivation would be complete without considering the interaction of motives that are external and internal to the learner. Extrinsic motivation refers to those factors external to the individual to pursue a task, whilst intrinsic motivation refers to the desire inherent within an individual to succeed (Crosby Bergin & Bergin, 2014).

Extrinsic motivating factors serve as reward in exchange for effort asserted to complete a task. Such examples are marks (the promise of, expectation thereof or interestingly, the threat of loss), tangible rewards such as sweets and lunch tokens, and social recognition. Extrinsic motivation finds its roots in behaviourist conceptualisations of learning, whereby learners' behaviour can be externally manipulated (Gould, 2012). Achievement-goal theory of motivation suggests that often mastery goals of learning (discovering personal relevance) are overshadowed by the emphasis on performance goals (proving aptitude, or disguising the lack thereof), which results in externalised and therefore personally distant conceptualisations of ability and success (Deemer, 2004). Turnure Pickens (2007) discovered in her doctoral research study that extrinsic rewards are often utilised to spark engagement, with the hope that intrinsic motivation will take over. However, results are often not permanent and do not always relate to transferred motivation for new tasks (Center for Mental Health in Schools, 2008; Gould, 2012). External rewards, if used incorrectly, can negatively influence the value that learners place on learning and effect their self-efficacy and self-determination, ultimately undermining intrinsic motivation (Weiner, 2013; Wentzel & Brophy, 2014).

Considering the South African Outcomes-Based Education's requirement of learners to take more accountability for their own learning (Coetzee et al., 2008), as well as the increased responsibility placed on the senior education phase learner to manage his or her own learning (Turnure Pickens, 2007), intrinsic motivation in particular is

an important consideration of the cognitive construction of motivation within individuals.

Coetzee et al. (2008) maintain that "intrinsic motivation results when perceived competence and perceived control are experienced simultaneously" (p. 104). Perceived competence or self-efficacy refers to the professed ability to succeed, which can have interesting consequences for the level of attention and commitment offered to a task (Zimmerman, 2000). Each individual's self-efficacy can be determined by past experiences of success and failure (such as in the classroom) as well as how these were conceptualised, and can influence how the individual will set goals, choose activities, approach a task and see it through to the end (Öztürk, 2012). Perceived control or self-determination refer to the extent to which learners feel that they have control over the circumstances required for success (Deci & Ryan, 2000). Self-determination theory (largely shaped by Deci & Ryan, 1985) refers to three motives that guide learners' involvement in learning: the need for competence (the extent to which learners feel able to perform in their learning environment), the need for autonomy (the extent to which learners feel in control of their own learning), as well as the need for relatedness (the interaction and connection with peers required for optimal learning) (Techatassanasoontorn & Tanvisuth, 2008). Experiential learning, whereby learners actively engage in a collaborative, hands-on learning process (Coetzee et al., 2008), affords learners considerable control over their own knowledge construction, and engages learners in the important social learning environment as advocated by the social constructivist theory of motivation.

In her doctoral research, Turnure Pickens (2007) discovered that unmotivated learners seemed to display behaviours such as hostility, talking out of turn, or passivity; behaviours often considered indicators of defiance rather than a lack of motivation. Schmakel's study (2008) of the motivation of seventh and eighth graders from four American schools confirmed that learners "tune out" when they become disengaged, and their marks suffer as a result (p.741). The Center for Mental Health in Schools (2008) refers to a sense of disengagement with learning and the school in general, which is either internalised resulting in boredom or apathy, or externalised in misbehaviour or even in severe cases, dropping out of the school system. Could many behavioural challenges be addressed by discovering what conditions provide

engaging experiences for learners? Flow theory posits that learners are ultimately intrinsically motivated when they are completely absorbed in a task that is challenging and personally meaningful (Stavrou, 2008; Shernoff & Csikszentmihalyi, 2009). In a Norwegian study of motivation in high school athletes, Dammyr (2011) discovered a connection between the experience of flow and students' intrinsic motivation to increase effort output. Similarly, Rathunde and Csikszentmihalyi (1993) discovered in a motivation study conducted with American adolescents that spontaneous interest has the ability to result in goal-directed behaviour, which in turn results in subject mastery. In this flow state, learners experience "no psychic energy left over for distractions, a merging of awareness with action, a feeling of control, loss of self-consciousness, and a contraction of the normal sense of time" (Shernoff & Csikszentmihalyi, 2009, p. 132). An interaction of various factors results in the experience of flow; the level of challenge offered by the task combined with the skills and ability the learner perceives himself or herself to hold. If the challenge is perceived to be high, but the learner considers his or her ability sufficient, flow is experienced. By overcoming challenges, learners experience a sense of mastery and confidence in their own ability, and are more likely to strive to replicate the feeling (Palmer, 2005). If the challenge is low, but the learner still considers the ability to be high, relaxation is experienced. However, apathy can be experienced when both the challenge and ability level are perceived to be low, and more dangerously for motivation, when the challenge is high, but is coupled with low ability (Shernoff & Csikszentmihalyi, 2009). The importance of matching the level of challenge to the learners' own perceptions of their abilities thus becomes particularly important to ensure intrinsic motivation continues to prompt personal learning. Studies show that group interaction often provides the combined (higher) ability and a new, collaborative perception of challenge that results in experiences of flow in classrooms (Shernoff, Knauth & Makris, 2000).

Social constructivism maintains that learners are driven by both intrinsic and extrinsic forces. Motivation to learn comes from both an active, personal thirst for learning, which is then stimulated and further conceptualised as a social motivation through external rewards offered by the community of learning, as well as through the collaborative construction of knowledge. As such, the question arises as to the effect that collaborative knowledge construction may have on the motivation to learn.

2.3.3 Collaborative motivation in the classroom

Although hugely outdated, Sivan's (1986) conceptualisation of the place of the social constructivist theory to explain motivation provides thought-provoking depth to the incorporation of inter- and intrapersonal developments of motivation. Sivan (1986) maintains that "motivation is a socially negotiated process that results in an observable manifestation of interest and cognitive and affective engagement" (p. 210). Therefore, it is through a combination of facilitating learners' cognitive development, capturing their personal interest and appealing to their emotions, whilst considering the influence of the social context of the learning environment that result in a social motivation to learn.

Sivan (1986) borrows a term from Vygotsky to coin an interesting expression that speaks to both social constructivist theory and cognitive development of motivation - the *zone of proximal development of motivation* (p. 227). Just as the MKO would facilitate the learning process to beyond what the individual is able to independently achieve, in terms of motivational development, the MKO is able to help steer the learner from a current to potential level of motivation. Sivan (1986) indicated that personal motivation also fluctuates as the cognitive and emotional states of the individual change as a result of interaction with MKOs. Brophy (1999) extended the concept of the motivational zone of proximal development to include *optimal matching* (p. 77). According to Brophy (1999), favourable classroom conditions are created when matching learners to challenging, interesting content that is perceived by the learners to be achievable and relevant, within a socially-collaborative learning context.

Palmer (2005) emphasises the importance of positive classroom climates that encourage belief in learners' ability. By portraying belief in the learning community's ability to persist and succeed, modelling motivated learning, providing extensive opportunities for success, offering learners control over work choices and providing personal feedback which highlights effort, Palmer (2005) indicates that teachers can play a vital role in shaping the motivational ethos of learning in the classroom. Brophy (1999) indicates that "motivationally effective teachers [and I would argue any MKOs such as learning technologies] make school learning experiences meaningful for students not only in the cognitive sense (enabling the students to

learn the content with understanding) but also in the motivational sense (enabling them to appreciate its value, particularly its potential applications in their lives outside of school)" (p. 78). Furthermore, Turnure Pickens (2007) indicates that teachers who are able to create classrooms that celebrate community in turn foster inherent group consciousness of the need to support each other academically.

Sivan (1986) maintains that in a social constructivist sense, motivation is one of many "cultural norms" of a classroom (p. 217). Accordingly, motivation relies on context, as well as the culturally-determined understanding of the role of motivation in learning. Largely, learners can take their motivation cues from the teachers' expression of her own motivation (Palmer, 2005), but it is also the broad community culture of learning (directed by shared cultural symbols, signs and knowledge) and the motivation to learn that directs how motivation manifests in the classroom (Sivan, 1986). Sivan (1986) speaks of "motivational norms" as constructs to be internalised by learners to govern their "ability to demonstrate willingness to engage and interest" (p.218). Accordingly, teachers have expectations of how their learners should "act motivated" (Sivan, 1986, p. 219), whether they really are intrinsically motivated or not! An example is the supposition that the motivated pupil puts up his or her hand with an answer immediately after the question is asked. In reality, the learner may well be motivated, but rather than acting according to the motivation script of the teacher, he or she may sit quietly and process the question, which may be incorrectly interpreted as disengagement or resistance. This concept of culturally-determined motivational norms provides interesting food for thought: To what extent do these norms provide educationalists with (and excuse the pun) the motivation to dictate how a learner should behave, instead of discovering those motivational factors that capture learner interest, satisfy their inherent needs and provide them with the experience of flow? An interesting exercise lies in the discovery of learners' perspectives of their own motives for learning.

2.3.4 Learner conceptualisation of motivation

Turnure Pickens (2007) discovered that many learners expected high school to be different to how they actually perceived it once they reach it. Entering the schooling phase whilst negotiating a minefield of hormonal and bodily changes, adolescent learners experience changing attitudes to school (Schmakel, 2008). They begin to

question authority, their futures and the reasons behind why it is that they must attend school (Palfrey & Gasser, 2008). Turnure Pickens (2007) maintains that each learner's motivation to learn can be viewed on a continuum, according to the learning context that presents itself. Schmakel (2008) indicated the need to look to learners' interpretation of their school experiences, conceptualisations of assessment tasks, as well as learners' perceptions of their ability to perform academically, so as to fully understand how they become motivated.

Covington (1999) investigated the impact that the emphasis of grade or mark attainment had for American college learners' personal motivation to learn. He declared that learners' self-worth is tangled up in what grade they receive as the visible determinants of their ability, as a result not only of the pressure placed on them by teachers to achieve and students' "emotional dependency on authority" (p. 128), but also by society's determination to use results as the yardsticks and indicators of personal worth and ability (Covington, 1999). He also discovered, however, that learners' degree of effort to attain their grade goals largely depended on the extent to which they found the content interesting and personally relevant (Covington, 1999). If technology could provide learners with authentic connections to real-world contexts, in formats that they have come to enjoy in their personal capacity outside of the school context (for example, in their use of blogs and social media), could such tools be incorporated into the classroom so as to ignite intrinsic motivation for learning?

Corbett and Wilson (1998) discovered in their longitudinal study with over 200 American middle school learners that adolescent learners were more motivated to learn in environments where teachers afforded them opportunities to take control over their own learning, afforded them respect whilst still maintaining a level of 'strictness', where they engaged more with their peers in completing projects that challenged them, and that introduced an element of fun to the learning experience. Schmakel (2008) noticed that adolescents in her study emphasised the importance of engaging learners by incorporating their interests into learning experiences. According to Schraw, Flowerday, and Lehman (2001, p. 86), *situational interest* (the product of offering authentic and original learning opportunities) is important to capture attention in class which in turn sparks *personal interest* (personal states of

interest that generate intrinsic motivation to further explore learning themes). Situational interest can be enhanced by providing the necessary background information required to understand tasks at hand, offering learner control in the form of a selection of choices in learning, as well as providing learning content that is personally relevant and engaging (Schraw et al*.,* 2001). In order to discover what the contemporary learner considers to be meaningful and motivating, it is necessary to delve into the world of the 'new-age adolescent.'

2.4 ADOLESCENCE

Adolescence refers to the transitional period between childhood and adulthood in which children begin to explore their surroundings as well as their own self-concept (Sebastian, Burnett & Blakemore, 2008). It is a period wrought with confusing inconsistencies of rights, responsibility and autonomy. According to South African legislation, whilst the human body is recognised as being fully prepared for sexual reproduction by the end of puberty, the legal age of sexual consent is sixteen; organisations cannot refuse to sell condoms to an adolescent over twelve years old, whilst a minor can terminate a pregnancy provided she has been advised to inform her parents (Green, 2010; Mahery & Proudlock, 2011). Adolescents can buy cigarettes and alcohol, vote, enter into legal contracts at age eighteen and enter into employment at age fifteen, but girls may enter into marriage (with parental consent) at age twelve (age fourteen for boys) and can be held criminally responsible at ten years of age (Green, 2010; Mahery & Proudlock, 2011).

Coleman (2011) posed the following interesting question: "Is adolescence a biological phenomenon, or is it socially constructed?" (p. 3). Given the neurological evidence of brain changes and cognitive developments that occur in adolescence (to be discussed in Section 2.4.1.2), coupled with an understanding of puberty, one cannot deny that adolescence is definitely marked by great biological developments, but the social nature of human beings calls for a social and cultural reading of adolescence as well. In consideration of the social-constructivist reading of the motivation effects of technology on learning, it is imperative to consider the adolescent's individual development through a social and cultural lens, as well as to investigate the new challenges that adolescents will face in a technological era.

This following section will investigate the biological, cognitive and psychosocial development of adolescents. The implications of a technical era on adolescent development will be discussed. Lastly, the implications of contemporary adolescence on school learning, and the implications thereof for education, will be explored.

2.4.1 Adolescent development

2.4.1.1 Biological development

Adolescence is widely acknowledged as the time frame that occurs between childhood and adulthood and is marked by the beginning of puberty (Hauspie & Roelants, 2012). One of the most noticeable characteristics of puberty is change of the physical form. The *hormonal feedback loop* refers to the body's mechanisms to maintain hormone levels within the body (Coleman, 2011, p. 26). The feedback loop controls the hypothalamus (which controls the pituitary gland), the pituitary gland (which controls hormone levels), and the gonads (testes in males and ovaries on females). Puberty marks a phase of life when the body is signalled to prepare the human for reproduction. The pituitary secretes hormones which trigger a rapid "growth spurt" (Coleman, 2011, p. 3); a sudden change in height, weight and dimension, as well as reproductive system maturation.

The body experiences changes in both primary and secondary sexual characteristics. Primary changes refer to transformations of the reproductive organs. In boys, the penis and testes enlarge and more testosterone is produced; in girls, the vagina, uterus, and ovaries prepare for pregnancy by commencing menstruation and releasing mature ova, the breasts enlarge to enable breastfeeding, and hips broaden to allow for childbirth (Coleman, 2011; Nevid & Rathus, 2009). Secondary sexual changes refer to those non-reproductive associated changes that develop and which differentiate the sexes. The male voice deepens as the larynx grows, shoulders become broader, hips narrow, overall muscle mass increases and boys experience great spurts in height, hair growth and facial oil secretion (Nevid & Rathus, 2009). In girls, body hair is produced, facial oil is secreted which can result in acne, and fatty tissue is stimulated to develop in new positions in the body which change the physical shape of the female form (Nevid & Rathus, 2009). In other parts of the body

in both genders, the heart almost doubles in size, the lungs expand greatly and general metabolism begins to slow (Coleman, 2011).

The body's hormonal changes that occur in puberty not only affect the physical body but the emotional state of the adolescent, and when coupled with the confusing nature of the physical changes, can be fairly traumatic for adolescents. The neurology of the brain changes as a result of new hormones being triggered, which promote changes in thought processes such as decision-making and interactive behaviour (Sisk & Zehr, 2005). Research points to the link between adolescent hormones and mood, whereby rapid mood changes (especially connected with menstrual cycles) occur and an increase in sexual thoughts of boys are prolific (Green, 2010; Marceau, Dorn, Susman, 2012). Green (2010) notes the importance of considering social and cultural influences in adolescent development, which will be discussed in Section 2.2.1.4.

2.4.1.2. Cognitive development

Physical changes to the structure of the brain, combined with the influence of hormones as discussed in Section 2.4.1.1, influences the cognitive development of adolescents, and as a result, new thought processing becomes possible (Sisk & Zehr, 2005). The information-processing model of cognitive development provides important considerations of the influence of neural structures, and which provides tangible evidence of cognitive development during adolescence. The area of the brain responsible for impulsivity inhibition, decision-making that considers the consequences of actions, as well as strategic thinking only develops in early adulthood, which could provide some explanation for the risk-taking and attention difficulties associated with adolescence (Giedd, 2004). Blakemore's studies (2010) on the neural structures involved in cognitive development indicate important considerations for this research. In essence, social interaction is imperative for learning.

Piaget regarded adolescence as the final stage of cognitive development (Plotnik & Kouyoumdjian, 2008). According to his theory of cognitive development, Piaget maintained that cognition develops in four distinct stages. From birth to age two, toddlers develop object permanence in the sensorimotor stage, whilst from two to five years of age, symbolic thinking in the pre-operational stage begins to develop

(Miller & Stoeckel, 2010). From approximately six to eleven years of age, the concrete operational phase paves the way for logical thought, culminating in the formal operational phase which occurs during adolescence and which spells the start of abstract thinking and hypotheses testing (Miller & Stoeckel, 2010). Piaget, therefore, maintained that adult cognitive functioning is cemented in adolescence. Whilst developing within the formal operational phase, adolescents are able to consider a wider range of variables in thinking and problem-solving, allowing for new conceptualisations necessary for abstract thinking (Newman & Newman, 2011). Piaget maintained that thinking changes occur through the adaptation of thought structures or frameworks, called *schemes* (Kail & Cavanaugh, 2012, p. 124). This occurs either through accommodation, whereby current schemes are adapted to accommodate new cognitions, or through assimilation, where new thoughts are adapted to fit into existing schemes (Shaffer & Kipp, 2013). Adolescents' thinking is characterised by egocentrism, whereby they believe that their experiences are unique and that others around them are fixedly concerned with their appearance and actions (Schwartz, Maynard & Uzelac, 2008). Schwartz et al. (2008) discovered that egocentrism persists into late adolescence, which can have far-reaching effects on behaviour, interaction with others and transition into adult life.

Vygotsky's social-contextual theory of cognitive development indicates that adolescents attain higher order thinking (consisting of language and meaning development) through their interaction with their culture; that is, observation of cultural practices such as the use of cultural tools or symbols (and the researcher would argue, exposure to technological competence), social learning that helps to reconstruct thought processes, as well as language development which enables expression of the inner world (Newman & Newman, 2011). As a result, each cultural context will produce individuals with different cognitive development patterns (Shaffer & Kipp, 2013).

A basic understanding of the neural development of the adolescent brain provides interesting insight into adolescent behaviour. By supplementing neural considerations of cognitive development with Piaget's theory of individual cognitive development as well as the cultural considerations of Vygotsky's theory, it is possible to construct a social-constructivist reading of cognition.

2.4.1.3 Psychosocial development

Hall, the first president of the American Psychological Association, was quoted as referring to adolescence as a time of *sturm und drung* (storm and stress), to indicate the tumultuous journey that teens must travel as they negotiate their own hormonal rollercoaster rides, rapid bodily changes, and fledgling independence (as cited in Nevid & Rathus, 2009). It is a time when relationships shift; the importance of the parent-child relationship adapts in favour of friendships and romantic relationships, and adolescents' begin to look introspectively as their relationship with their own self-concept is heavily influenced by the cultural context and conceptualisation of the individual's perceived 'fit' within the environment (Nevid & Rathus, 2009).

Self-concept refers to the perception and conceptualisation that one develops about oneself; including feelings of self-worth, competence and belonging (Mercer, 2011). It is during adolescence that people begin to question their identity, as a result of a combination of self-appraisals emanating from past experiences, as well as the perception of how others see them, termed the *looking glass self* (Sebastian et al., 2008, p. 441). This socially-nuanced perception of self becomes more central in constructing the self-concept as the adolescent's social interaction widens as a result of a growing sense of independence, as well as from exposure to a wider audience as afforded by technological platforms (Sebastian et al., 2008). Erikson's theory of psychosocial development enables inspection of the role that social interaction plays in the development of the self, which speaks to the social constructivist underpinning of this research.

Erikson maintained that there are eight main phases of psychosocial development throughout a human life time, in which people are to negotiate certain challenges termed *crises,* in order to progress to a higher level of psychosocial development (Newman & Newman, 2011, p. 70). The adolescent phase, according to Erikson, is marked by the crisis of individual identity versus role confusion (Miller & Stoeckel, 2010). Adolescents must determine their new role in society whilst transitioning from the dependency of childhood to the independency of adulthood, which in many cultures spells the transition from a cosseted state of being to a more equal adult status (Newman & Newman, 2011). It is through interpersonal interaction that individuals begin to construct both a "private" and "public" identity for themselves that

not only considers familial, peer and societal demands, but also directs the adolescent to an identity that sits comfortably within the individual (Newman & Newman, 2011, p. 412).

Family relationships and interaction patterns are often the first to experience change within the adolescent phase of development. Adolescents begin to express their need for autonomy as they test out their new pre-adult roles, which place stress on the equilibrium of the familial hierarchy (Laursen & Collins, 2009). The parent-child relationship becomes more egalitarian after initial tussles from adolescents for more trust, respect and independence; both the adolescent and parents learn to react to the adolescent's fledging need for independence (Kail & Cavanaugh, 2012; Nevid & Rathus, 2009). According to Brown and Klute (2006), adolescents who experienced strong familial bonds in their childhood perceived the quality of their friendships also to be high, which will in turn influences their experience of and behaviour in romantic relationships (Laursen & Collins, 2009). Adolescents begin to place more value on peer and friendship groups, whose members can relate to similar experiences of family upheaval, and as a result, adolescents begin to rely less on the family unit for guidance or support and more so on their friends (Nevid & Rathus, 2009; Laursen & Collins, 2009; Horst, Herr-Stephenson & Robinson, 2010).

Adolescents will usually form part of a number of peer groups of varying stability, size, cohesion and duration (Brown & Larson, 200). As such, peer acceptance is important for adolescents' self-concept and self-esteem. As they spend much of their adolescent lives with their friends at school, these youths begin to discover the boundaries and expected norms of friendships and social interaction within the microcosm of the school (Moreno, 2011; Shaffer & Kipp, 2013). The importance that adolescents place on peer relationships can result in positive as well as negative influences on personal development. Friendships provide important confirmation of self-worth, imperative for the establishment of a healthy self-concept, as well as act as emotional protective factors against the effects of family strife (Bukowski, Motzoi & Meyer, 2011; Green, 2010). The need for very close friendships begins to decrease as adolescents look to romantic relationships for a similar level of emotional connection that they have with their friends (Brown & Larson, 2009). Adolescent romantic relationships provide opportunities for sexual exploration and companionship, whilst older adolescents begin to place importance on intimacy, trust

and support (Kail & Cavanaugh, 2012). Peer support of budding romantic relationships is still important for adolescents (Kail & Cavanaugh, 2012).

Whilst positive peer relationships play an important socialising role for adolescents, bullying and peer pressure can play havoc on adolescents' conceptualisations of their self-concept. Boys are more likely to bully and be bullied verbally or physically, whereas girls' bullying is more subtle and emotional (Green, 2010). Frequent and relentless bullying has been linked to risks of depression, suicidal ideation and suicide attempts (Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2008). Peer pressure can influence individuals to behave in a manner incongruent to their beliefs and values, and has been linked to forays into risk-taking and maladaptive behaviour such as substance abuse and delinquency (Steinberg & Monahan, 2007).

New concerns begin to weigh on peer group dynamics, often fuelled by media and popular culture. Socially-constructed conceptualisations of masculinity, femininity and gender roles place emphasis on gendered characteristics and appearances; boys' are gendered to be assertive and dominant, whilst emphasis is placed on girls' sensitivity and care for her community (Athenstaedt, Mikula & Bredt, 2009; Connell, 2005; Coleman, 2011). Girls typically become concerned with physical appearance and weight, whilst boys' concerns feature weight and muscularity, although the ascribed importance thereof is different according to different cultures (Newman & Newman, 2011; Jones, & Crawford, 2005). Affiliation with peer groups can be important sources of group support, whereby adolescents and can form their own subcultures within the dominant culture of society, offering invaluable support especially to those who may feel at odds with the identity of the dominant culture (Williams, 2006).

Ybrandt (2008) maintains that girls' negative self-concepts typically leads to internalised problems such as depression, anxiety, somatic complaints and withdrawal from society, whereas negative self-concepts in boys results in more externalised behaviour such as aggression and delinquency. As a result of trying to measure up to a societal standard of 'manhood' and 'womanhood', adolescents often abandon many of their beliefs, morals and ethics to follow a socially sanctioned concept of adulthood before they have fully consolidated their current phase of adolescence (Kail & Cavanaugh, 2012). They begin to explore their surroundings

and take risks (Connell, 2005), ultimately pushing the boundaries, all in the name of discovering the new roles they are to play as young adults in society. As a result, adolescents run the risk of losing sight of their individual identity, developing harmful, inauthentic self-concepts, and ultimately not managing the crisis of role identification (Newman & Newman, 2011).

2.4.2. The contemporary adolescent

According to 2013 statistics, there are over 10 million adolescents in South Africa (Statistics South Africa [StatsSA], 2013). As adolescents make up a fifth of the population, consideration of this cohort is important for the economic future of the country, and an investment in their future is imperative. However, in order to best meet the educational needs of contemporary adolescents, it is imperative that one become fully enmeshed in the world of contemporary adolescents, so as to understand their motives, drives and goals.

2.4.2.1. The Net Generation of digital datives

As indicated in Section 1.11.3, the term *digital natives* has been used to describe those for whom utilising technology proficiently is as natural and comfortable as speaking a mother tongue language (Prensky, 2001). This term has received much critique, and some of these suppositions warrant consideration in order to understand the role that technology plays in the schooling system.

Clark (2013) acknowledges that the term is rather simplistic, and encourages the assumption that all young people are computer-literate and ‘tech-savvy’. It has also been argued that it is such assumptions that exacerbate the gap between students and teachers, the latter of whom are portrayed as “hopelessly out of touch” with both their students and education at large (Jenkins, 2007; Selwyn, 2009; Helsper & Enyon, 2009). However, Clark (2013) does credit the sentiment behind the description of the generational gap in the sense of comfort with which various generations rely on technology in their everyday lives. General considerations of technology by various generations may well play an important role in the utilisation and effectiveness of learning technology in the school environment, and such a discussion is called for in this research.

There has been increasing interest in understanding distinct generations and how they fit into the business-, marketing- and recently, the educational world. McCrindle (2009) argues that not all people who fall within the various age cohorts function identically, but it does provide interesting insight into how societal structures influence human development. The generations can be investigated under seven age cohorts: *Seniors* (born before 1925), *Builders* (born between 1926 and 1945); *Baby Boomers* (born between 1946 and 1964); *Generation X* (born between 1965 and 1981); *Generation Y* (born between 1982 and 2000); *Generation Z* (born between 2001 and 2010); and the future generation, not yet a part of the education system, *Generation Alpha* (born after 2010) (McCrindle, 2003; McCrindle, 2009; Quinterno, 2013). The seniors generation, also referred to as the *GI generation*, is marked by social order and conformity during the adversity surrounding World War I (Kowske, Rasch, & Wiley, 2010). Patriotic and respectful of authority, the builder cohort was also called the *silent generation* as they were conditioned to work diligently to help restore the economy (Bland, Taylor, Shollen, Weber-Main & Mulcahy, 2009, p. 117). Baby boomers grew up with more means than their parents after World War II, and although loyal to their work, they appreciate a work-play balance in life (Bland et al., 2009). Generation X children experienced uncertainty growing up as a result of an unstable economy and a period of high divorce rates, and as such are highly independent, requiring work stability and recognition (Bland et al., 2009). Generation Y, also referred to as the *Millennial Generation* (Delcampo, Haggerty, Haney & Knippel, 2012, p. 15), is the first to experience a taste of the internet and is confident and somewhat entitled as a result of a child-centred environment growing up (Bland et al., 2009). Generation Z was born into an era marked by connectivity, is aware, collaborative and assiduous (Geck, 2007). Generation Alpha has only just begun to enter the schooling system now, but its experience with technology started from a younger age and has a large influence on its conceptualisations (McCrindle, 2009). It is largely Generations Z and Alpha that make up the *Net Generation*, a term coined by Tapscott in 1997 (Oblinger, Oblinger & Lippincott, 2005; Berk, 2010). This cohort makes up the learners who are currently in the education system, or who will soon face formal schooling. An investigation into their characteristics is important to understand and enlighten the context in which contemporary education resides.

The Net Generation, as their name suggests, was born into an era where technology and innovation, particularly the internet, is taken for granted; these digital natives or *screenagers* (Yoon, Lee & Lee, 2013, p. 534) do not know a world without the internet, the World Wide Web, social networking, emailing, message chat forums, MTV[1], and instant messaging (Prensky, 2001; Berk, 2010). The cultural phenomenon that the digital world offers has interesting consequences for adolescent development.

In an American study conducted by Madden, Lenhart, Duggan, Cortesi and Gasser (2013) with just over 800 adolescents between the ages of 12 and 17, 95% of the participants reported that they had access to the internet, increasingly from their mobile phones; 93% of the participants either had their own computers (with internet connectivity) or had access to one; and 23% owned their own tablet computer[2]. In stark contrast, as of 2011, 64.8% of South African households had no internet access (Van der Merwe, 2013). Of the remaining 35.3 % of households who could access the internet, only 8.6% could access the internet from a computer, whilst 16.3% accessed the internet from a mobile phone and 10% from other places (Van der Merwe, 2013). Whilst national internet penetration into the South African market is projected at 53% by the end of 2014, mobile internet penetration is projected at 154%, which indicates the emerging market of mobile telecommunications within South Africa (Lange, 2014).

As a result of contemporary influences on modern living, the way adolescents' identities (both personal and social) are shaped has evolved markedly from the past. Although traditionally thought of as an antisocial endeavour, Watkins (2009) explains that gaming offers boys a way to bond over a mutual connection, whilst participation in social media by both genders has become a way of life for adolescents. The gender divide regarding the interest in, opportunity with which to engage and opinions of technology between genders is widely researched. The socially constructed general opinion is that boys are generally considered to be more techno-savvy and have more of an interest in IT, whilst girls are depicted as being disinterested and even fearing technology (Moghaddam, 2010;

[1] MTV stands for music television, and is a popular channel that hosts various artists' music videos.
[2] A tablet is a handheld computer (usually wirelessly connected to the internet) with a touch screen interface (Rouse, 2014).

Bray, 2013). The stigma appears to cross all level of income and social standing, and as a result, affects the access to technology that is afforded to both genders (Moghaddam, 2010). According to research conducted by Cotten, Shank and Anderson (2014) and Moghaddan (2010), girls and boys appear to view technology as having differing purposes; whereas girls see technology use as a means to an end and tend to use technology for communication and product creation (such as researching for and typing up an essay), boys engage in the use of technology as an end in itself (largely through the through the media of gaming and communication). This engagement with technology in order to connect with others has interesting consequences for social interaction patterns and identity construction.

Palfrey and Gasser (2008) argue that although adolescents' personal identity construction follows largely the same path as in previous eras (save for the effect from more widely accessible influences), it is their social identities that have changed the most rapidly; with increased interconnectedness (and transparency) afforded by the social network web, adolescents have on the one hand, more control over how they portray themselves, but less control over how people may interpret the multiple, ever-evolving representations of their identity.

As a result of the extensive time that adolescents spend using the internet, the distinction between online and offline identities is becoming less obvious (Hongladarom, 2011). The online world offers a space for users to experiment with a variety of different roles that represent different compartmentalised aspects of their life (Palfrey & Gasser, 2008). Users are able to experiment with various means of expressing themselves, develop social skills and practice inferring social cues and nuances (O'Keeffe & Clarke-Pearson, 2011; Amichai-Hamburger & Hayat, 2011; Palfrey & Gasser, 2008). In an international study with over 22,000 participants from 13 countries, Amichai-Hamburger and Hayat (2011) discovered that, contrary to previous research indicating that the internet causes anti-social tendencies in adolescents, the internet has the potential to afford adolescents the opportunity to connect with more people, and especially with those who share similar characteristics. It is perhaps due to the chaotic world in which we live, whereby adolescents are used to multitasking in order to negotiate the vividly stimulating society in which they find themselves, that they adopt these

multiple representations readily; perhaps each compartmentalised representation of the self satisfies a certain need or function that the child's inner psyche craves. Whilst it would appear that technology may afford adolescents the avenues through which they can develop psychosocially, the educational value of technology for learning requires further investigation.

2.4.2.2. Contemporary learners and implications for education

Sir Ken Robinson's 2010 'TED Talk'[3] which has been viewed by almost five million online viewers at the time of this research, provides an interesting perspective on the rationale behind contemporary education systems. Robinson (2010) indicates that education is slow to catch up to current anthropological trends; current education curricula, and the delivery thereof, were designed to create conformist workers of the industrialisation era (Reigeluth & Joseph, 2002). Another education pioneer, Seth Godin, argues that different skill sets which are more fitting for twenty-first century individuals are required from school leavers than those of yester year, for whom the schooling systems still cater (Godin, 2012). According to Prensky (2001, p. 1), "Today's students are no longer the people our educational system was designed to teach." New demands are placed on contemporary adolescents in education as a result of changing trends in the workplace, technology, and society at large. This consideration begs the question: How do twenty-first century learners differ from their fore fathers, and what implications does this have for education?

Berk (2010) maintains that there are contemporary learner characteristics that have important implications for education.

- Learners learn by creating content through social interaction

Recent education transformations have resulted in a shift in thinking about learners' agency – learners are no longer reliant on teachers as knowledge holders; they are being taught the tools to search for and reflect on the information themselves (Vass & Littleton, 2010; Hazari, North & Moreland, 2009). Technology formats allow learners to work together in collaborative efforts to produce new information (Kleine

[3] A TED Talk refers to a short presentation by a speaker to a live audience, which is recorded and uploaded for free perusal by online viewers. TED stands for Technology, Entertainment and Design, and as such refers to the content of the presentations. The slogan, 'Ideas worth sharing,' harnesses the aim of the non-profit enterprise – to afford the public the chance to be at the forefront of innovation.

Staarman & Mercer, 2010; Li, Bado, Smith & Moore, 2013); a practice which speaks to the social constructivist premise that knowledge construction takes place in a social context (Beck & Kosnik, 2006).

As Prensky (2001, p. 2) notes, "[digital natives] function best when networked." Rankin (2014) refers to the term 'social computing' to describe the social network that binds users in a shared activity (p. 88). In addition, learning is heightened when learners are able to engage in collaborative efforts and create their own expression of their learning (Beck & Kosnik, 2006; Yoon et al., 2013). Much research has been conducted which points to the successful learning opportunities offered by various social interaction formats within the classroom, for example, experiential and cooperative learning, which emphasise the importance of reflecting on experiences of learning and effective group collaboration respectively (Kolb, Boyatzis & Mainemelis, 2001; Felder & Brent, 2007). Project-based learning offers learners the opportunity to fully engage in authentic learning scenarios that serve as evidence of genuine learning, and offer peers the opportunities to pool strengths in collaborative efforts to complete tasks (Bell, 2010). In their social lives, adolescents interact with each other via photo-sharing, accumulating published works, social bookmarking, media uploading and sharing, and blog posting (Palfrey & Gasser, 2008; Berk, 2010; Yoon et al., 2013). In a Scandinavian study with conducted by Mylläri et al. (2011) with 48 learners (between 11 and 18 years of age), the participants, especially girls, indicated that they enjoyed using technology to interact with their friends outside of school. If adolescents use such tools to interact and collaborate with each other outside of the formal learning environment, there is an opportunity to bring such interests into the classroom, and engage learners by using the interaction formats with which they are comfortable.

- Learners are "techno-savvy"

As previously indicated, Prensky (2001) utilised the term digital natives to refer to those for whom utilising technology can be likened to speaking a native language. He contrasted this concept with *digital immigrants* (para.6), a term used to describe those who have not been socialised with technology from an early age, and whom are attempting to learn the "techno-lingo" as a second language (Prensky, 2001;

Brown & Czerniewicz, 2010). Examples of digital immigrants are the parents and teachers of digital natives. Prensky (2001) highlights the problems that occur when teachers of digital natives are digital immigrants; many become overwhelmed and feel threatened when they realise that their learners' technological prowess surpasses their own (Stefl-Mabry et al., 2010; Buabeng-Andoh, 2012).

Although Horst et al. (2010) maintain that even those who do not personally own computers or have access to the internet can still be considered digital natives as they are part of a shared media and technology culture that prizes digital media, a digital divide becomes apparent between those with early and constant exposure and those with disparate access to technology (Stefl-Mabry et al., 2010). It is important to consider that learners will not have the same access to technology as a result of their experiences, cultural importance ascribed to technology, or familial circumstances (Geer & Sweeney, 2012; Helsper & Eynon, 2010; Boyd, 2014). This is an important consideration, especially for the South African context; one cannot assume that technical know-how is equal in a country where a large majority of learners hail from disadvantaged backgrounds (Hardman, 2005).

- Learners rely on search engines for information

Reigeluth and Joseph (2002) argue that learners do not learn according to a standardised, uniform grade year plan as stipulated by national departments; customised individualised education schemes recognise the need for education that is designed according to individual learning paces. They also explain that the role of teachers must change from a "sage on the stage" presenter to a "guide on the side" facilitator (Reigeluth & Joseph, 2002, p. 11), whereby learners take more responsibility for their own education. The use of technology for learning has been found to help learners to gain learning autonomy and provides skill-, processing speed- and perception-appropriate facilitation (Reigeluth & Joseph, 2002; Sampson, Karagiannidis & Kinshuk, 2010). Berk (2010) indicates that modern learners turn to search engines for information retrieval as they value the convenience, dependability, inexpensive, and swift information retrieval possibilities. Brabazon (2006) complains that learners will rely on inferior sources if they are not taught to evaluate the credibility of sources, an important consideration for digital literacy education. The *Google Effect* refers to a change in the way that people access and

store information in their minds, as a result of the ease of internet information surfing (Bohannon, 2011, p. 277). According to this notion, people have become so reliant on the internet for accessing information that they no longer bother to commit information to memory (Bohannon, 2011).

- Learners are interested in multimedia

According to Prensky (2001), "[Learners] prefer their graphics *before* their text rather than the opposite," (p. 2). The printed word just does not hold enough appeal to learners who have grown up in a world of (over) stimulation. According to Nawotka, editor-and-chief of *Publishing Perspectives,* printed book sales decreased worldwide in 2012; South African sales specifically had fallen by 8.8% (Nawotka, 2013). Teachers are turning towards multimedia in the form of e-textbooks, visual presentation forms, podcasts, videos and more to enhance content presentation, capture learner attention, improve comprehension, enable better retention, and enhance the authenticity of the context (Gilakjani, 2012; Astleitner & Wiesner, 2004; Yoon et al., 2013). Presenting information in a multitude of formats also caters for the variety of learning styles that learners prefer (Sankey, Birch & Gardiner, 2001).

According to Turnure Pickens (2007), learners have become dependent on multimedia such as television games and television for stimulation, and teachers are starting to turn to games in an attempt to capture their learners' attention. A study conducted in Singapore in 2008 with 15 adolescents (aged 14 to 16) indicated that the use of a gaming format to educate adolescents about HIV/AIDS resulted in adapted attitudes towards the content (Chib, Lwin, Lee, Ng & Wong, 2010). *Gamification* refers to the utilisation of the engaging properties of games within education to encourage engagement and learning autonomy (Muntean, 2011). Games can engage learners in learning opportunities by way of several strategies; trial-by-error learning (a popular gaming strategy whereby learners learn the value of learning from mistakes); engaging the affect; offering progress feedback; appealing to players' imagination; offering non-threatening social interaction with other players by speaking to adolescents' concern for social reputation; engages the senses with a wide variety of visual, tactile and auditory stimuli; and ultimately leads learners to a state of flow encapsulation (Huang & Soman, 2013; Muntean, 2011; Felicia, 2012; Klopfer, Osterweil, Groff & Haas, 2009; Cohen, 2011).

- Learners can multitask

Prensky (2001) notes that unlike digital immigrants who like to learn systematically, digital natives have been socialised to negotiate a flurry of simultaneous stimuli (from fast-paced TV and video games to instant searches on the internet), learning to multitask at an early age; they are used to being rewarded constantly for their efforts (Warner, 2010; Felicia, 2012). Contemporary learners are punished for not paying attention; however, they do not find the activities worthy of holding their attention (Prensky, 2001; Felicia, 2012). Learners appreciate being able to collaborate and discuss strategies instead of passively listening to the teacher and taking down notes, ultimately losing concentration and becoming bored (Mylläri et al., 2011; Geer & Sweeney, 2012; Stefl-Mabry et al*.,* 2010). In a study conducted by Stefl-Mabry et al*.* (2010), learners indicated that they found the silence in school "distracting" (p. 74), and that many would prefer listening to music whilst they worked in order to concentrate better. Perhaps allowing learners the freedom (and providing them with the trust) to work independently, with the tools that speak to their socialised development, learners would gain more autonomy and be motivated to work independently more often.

2.5. LEARNING TECHNOLOGY

According to Collins and Halverson (2010, p. 18), "the world of education is currently undergoing a second revolution" as it attempts to embrace contemporary society and culture within the classroom. Technology plays a large part of the everyday ecology of adults, adolescents, and children; adults turn to the internet for market research in business, adolescents maintain their social identities through social networking platforms, whilst children play games on their parents' (and increasingly, on their own) tablets. Technology used in the classroom (and at home to support learning) promises exciting advances in critical thinking, autonomy and learner engagement; however, researchers contend that as learning technology develops, it is yet to harness the full potential for teaching and learning (Selwyn, 2010).

Instructional design, information and communications technology and educational information engineering are all terms used synonymously with learning technology. In essence, learning technology is the interface at which educational content and teaching and learning pedagogy meet with the technological tools to bring learning to

life (Mishra, Koehler & Kereluik, 2009). According to Selwyn (2010), it is important to consider a “goal-oriented problem-solving systems approach” when reflecting on learning technology (p. 107), reminding schools that tools should be used to compliment learning and not be the end product. This was reflected in a Turkish study led by Kahveci (2010) with 158 learners (from 9th to 12th grade) that investigated learner attitudes towards learning technology. Kahveci (2010) discovered that learners expressed motivation to use technology to enhance learning, and expected that their subjects used technology to augment their learning. Whilst technology continues to evolve at a rapid rate, the nature of learning as “changes in attitudes, beliefs, capabilities, knowledge structures, mental models, and/or skills” (Spector, 2010, p. 30) remains the same; the challenge is to discover how best to support such learning in the social context of a global digital revolution. This approach enables the consideration of social contexts, taking into account how various systems influence knowledge creation, which speaks to the social constructivist theory of knowledge generation.

Selwyn (2010) outlines the responsibility of education practitioners when utilising technology for teaching and learning, which provides a useful structure to delineate this research on learning technology. Consideration should be afforded to the integrity and professional honour with which practitioners must endeavour to a) in a reflective manner, continue to research and discover new, relevant technologies and tools that facilitate learning, b) utilise technology to support learners’ needs to construct their own knowledge, and c) provide tools that can generate lasting understanding (Selwyn, 2010).

In order to investigate the use of educational tools and techniques in education, it is imperative to examine learning technology as a scholastic phenomenon. In the following section, the integration of technology with traditional teaching and learning methods will be investigated, followed by a contextualisation of education in the internet era. A brief history of learning technology tools will then be discussed, as well as the place of contemporary teaching and learning aids investigated. Finally, the state of South African learning technology will be examined.

2.5.1. A shift in pedagogy

As discussed in previous sections, the education system has been stuck in a pedagogical rut for many years, designed to serve the needs of the citizens of the industrialisation period (Robinson, 2010; Reigeluth & Joseph, 2002; Godin, 2012; Prensky, 2001). As education adapts to suit the needs of the twentieth-century populace, there is a move from monitoring passive learners as they acquire information from omnipotent teachers to enabling active participants in their own collaborative knowledge creation (Aslan & Reigeluth, 2011; Collins & Halverson, 2010). There is a shift in pedagogy from teaching to coaching, directing and facilitating - teacher-centred education becomes learner-centred learning, and the need for a marked development from standardised curricula design towards personalising learning to suit individual skills and needs becomes evident (Aslan & Reigeluth, 2011; Collins & Halverson, 2010; Handsfield, Dean & Cielocha, 2009). Learning technology has shown the power to personalise the learning experience and engage learners to be active knowledge constructors (Hazari et al., 2009).

The learning environment has transformed from that offered by the constraints of the classroom to extensive connection with the outside world (Holcomb & Beal, 2009). However, as transformational as the internet has been for education, it is not without its challenges of implementation costs to schools and parents, training, administration, and fears of security. The global potential afforded by learning technology is marred by access limited to the privileged who can afford it, a phenomenon which serves to widen the digital divide between the those with and without access to technology innovation (Spector, 2010). The challenges concerned with the digitalisation of education will be discussed further with particular reference to the South African education digitalisation in Section 2.5.5.

2.5.2. The development of technological teaching and learning aids

The use of technology in the classroom to facilitate, scaffold, and motivate learners (essential considerations with regard to the nature of social constructivist learning) is by no means a new endeavour. Whilst long-established tools such as the slate, pencil and ball point pen have all played an imperative role in transforming educational practices, it is electronics that have captured and managed to hold the

attention of learners and encouraged engagement in independent learning (Dunn, 2011; Betcher & Lee, 2009).

The first projector found its way into a classroom as early as 1870. The projector was dubbed “the magic lantern” and photograph images on glass slides were projected onto a blank wall (Dunn, 2011). Radio was introduced to American schools in 1925, and the concept of personalised schooling was introduced in the invention of headphones in 1950, affording learners the opportunity to listen to tapes at their own learning pace (Dunn, 2011). Instructional television was welcomed into classes in the 1950s, but according to Aslan and Reigeluth (2011), lacked opportunities for interaction required for essential learning. Xerox introduced the photocopier to the world in 1959, which enabled the duplication and accumulation of numerous sources (Dunn, 2011). In the same year, the University of Illinois launched the PLATO (Programmed Logic for Automatic Teaching Operations) project in America, offering computer terminals to American universities and schools, to deliver what became the first digitalised, individualised learning tutorials (Aslan & Reigeluth, 2011). Desktop computers were introduced to schools in the 1970s, and Apple Incorporated products dominated the educational scene due to their affordability, availability of parts and graphic quality (Aslan & Reigeluth, 2011). Betcher and Lee (2009) argue that the interactive whiteboard was the first technology product (introduced in the late 1990s) designed for education in mind, instead of adapted for the classroom after prior introduction in the business and general consumer market.

In the early 2000s, various form of learning technology were typically used to meet the needs of “professional development,” “data management,” and “internet connectivity” (Aslan & Reigeluth, 2011, p. 9). Widespread access to the internet in the early 2000s resulted in a change of thinking about teachers as knowledge kingpins; teaching roles began to change to guide learners to gather their own information sources, critically evaluate information and construct their own understandings (Sharma, Xie, Hsieh, Hsieh & Yoo, 2008; Collins & Halverson, 2010).

With the introduction of laptops, tablets, and mobile technology to the learning technology classroom experience, learners have personal access to a device without having to share with other learners (Valiente, 2010; Yoon et al., 2013). Devices are

now specifically designed with the learner in mind; they boast extended battery life, drop-resistant, water-resistant, and lightweight units, and prices have shown a steady decrease as manufacturers compete with each other for access to the market (Marés, 2012; Valiente, 2010). Devices can display information in a variety of formats, house e-textbooks all in one tool (which removes the need to carry multiple books), offer virtual exploration of varying contexts outside of the physical classroom, connect learners to a host of information online, enable and encourage interactivity with other learners, save costs in textbook, assessment and teaching programmes, and fundamentally, encourage learners' engagement in their own learning (Marés, 2012; Valiente, 2010; Goodwin, 2011; Yoon et al., 2013).

Regardless of the tool used to accomplish engagement, it is imperative to contextualise learning within an authentic learning scenario, in order for learners to make meaning of the content, as discovered by Littlejohn in an Italian study conducted with adolescents in 2008. Lei and Zhou (2007) discovered in an American adolescent study concerning technology and motivation that learners respond to the quality of technology utilised in education, and not to the quantity. In fact, they concluded that too much technology could be detrimental for learning (Lei and Zhao, 2007). As such, the integration of technology into classrooms calls for new responsibilities for teachers, content developers, school management, parents, and the learners themselves. Berk (2010) indicates the need for thorough assessment of teacher and learner needs before utilising technology for learning, so that technology is not used solely for the sake of 'keeping with the times'.

2.5.3. Integrating learning technology into the classroom

Jay Cross indicated in his contribution to the foreword of Bonk and Graham's *Handbook of blended learning: Global perspectives, local designs* (2006) that businesses look for employees that can work independently of supervision, whilst schools largely inculcate in their students that they must wait for information and direction in order to learn. Cross describes many schools as insular, protected environments where real-life lessons from the outside world are considered potentially distracting to the focus of the academic life within the school walls (Bonk & Graham, 2006). Many schools do not take into consideration the digital cultures in which contemporary adolescents are already embedded, outside of their school lives

(Greenhow, Robelia & Hughes, 2009; Berk, 2010). By denying learners access to the technologies that make up a large part of their lives, as well as a part of the prevailing culture in modern society, they will not possess the necessary technological proficiencies required for work and general life after school in the twenty-first century (Greenhow et al., 2009).

The understanding of the impact of authentic, real-life experience on education has done an about-turn in contemporary education. Schools are beginning to relax the boundaries that have for so long separated academic and external affairs (Bonk & Graham, 2006). Education models have begun to embrace the physical, social, corporate, research, and cyber worlds outside of the classroom to enrich the quality of education, so as to produce well-rounded individuals who are ready for the world that begins after formal schooling ends (Bailey, Ellis, Schneider & Vander Ark, 2013). As schools move from an information-focused education to a conceptual era of education, learners are transformed from information seekers to information 'contextualisers,' directed to process and make meaningful connections with the plethora of online information (Van Deuren, 2014).

Blended learning refers to a mixed method of education that incorporates the traditional concept of real-time, face-to-face lessons with a teacher and peers in a physical location such as a classroom, with the online discovery of content in which there is "some element of student control over time, place, path and/or pace" of learning (Staker & Horn, 2011, p. 3; Bernatek, Cohen, Hanlon & Wilka, 2012). This form of learning brings together traditional teaching pedagogy, environments and instruction with learning technology, media, and online culture (Hoic-Bozic, Mornar & Boticki, 2009). As such, learning is not constrained by the knowledge or initiative of the teacher (Lai & Xue, 2012); learners can access and learn from endless sources, as well as collaborate with each other and construct their own creations and understanding. Blended learning offers authentic opportunities for learners to take control of their own learning at their own pace, as indicated by Tavenner (2012) who piloted a study of successful blended learning in two San Jose high schools in California. In South Africa, Spark Schools provides a combination of face-to-face teaching time in a classroom with online computer laboratory learning (Brewer & Harrison, 2013).

Pure online learning (without face-to-face contact with teachers and peers) has shown some success for learners where access to traditional schooling is neither available nor possible, for example in rural areas, for remedial instruction, and with home-schooled learners (Staker & Horn, 2014). However, Lai and Xue (2012) argue that imperative social and emotional connections between teacher, learner, and peers are largely missing in such learning models. Blended learning has developed as an offshoot of online learning to amalgamate the traditional school experience with online learning, within varying levels of online influence.

At high school level, blended learning typically follows one of four models; rotation, flex, A La Carte and enriched virtual models (Van Deuren, 2014). The rotation model requires learners to attend to different learning methods based on a set schedule dictated by the teacher (Staker & Horn, 2014). Within this model, all learners in the class can rotate between group, peer or individual activities either online or face-to-face for one lesson (station rotation), learners can rotate for different learning areas (lab rotation), learners may engage with face-to-face interaction during class and connect with online content after school hours (flipped classroom), or learners will rotate between face-to-face and online engagement according to each learners' personalised teacher-set schedule (individual rotation) (Staker & Horn, 2014). The flex model utilises more online learning which may call for fewer face-to-face activities, however, the core element to this model is the flexibility with which learners can work at their own pace online and then schedule with the teacher to engage in the topic face-to-face (Van Deuren, 2014). The A La Carte method enables learners to complement their education with an additional online course (Staker & Horn, 2014). In the last model of blended learning, virtual enriched learning, learners spilt their time between attending a physical classroom and working at their own pace online off of the campus, a practice which offers learners the flexibility of online learning with the social interaction of the school experience (Staker & Horn, 2014).

As is evident in the various schooling models described above, access to the internet has catapulted education into the twenty-first century (Aslan & Reigeluth, 2011). An investigation into its use for teaching and learning in schools is vital in a discussion of the influence of learning technology on education.

2.5.4. Education in the internet era: Web 1.0 to Web 3.0

The *World Wide Web* was developed in 1989 by Tim Burners-Lee, and according to Aghaei, Nematbakhsh, and Farsani (2012, p. 1), refers to a "techno-social system that enhances human cognition, communication, and co-operation." The Web 1.0 platform was initially developed for businesses to provide information to the public, and was largely limited to a content depository where users could broaden their search for relevant information (Cormode & Krishnamurthy, 2008; Aghaei et al., 2012). Content was largely controlled by a small pool of authors, who, as a result of Web 1.0's limited capacity for viewers to interact with the site content, effectively owned the knowledge (Greenhow et al., 2009). Within education, the potential for education to meet a world of information was realised by schools that provided learners with opportunities to access global information in engaging formats (Handsfield et al., 2009; Greenhow et al., 2009). A South African study that utilised various multimedia presentations to prompt 23 Grade 8 learners to engage with the subject content resulted in higher levels of average concentration, motivation and achievement, when compared to a control group (Bester & Brand, 2013). Similarly, in a Taiwanese study with 44 learners, video blogs ('vlogs') were utilised in order to engage the learners in English public speaking lessons, whereby the learners reported interest in the material, ease of access and revision, and a motivation to learn (Shih, 2010). Web 1.0 opened up a world of resources for teachers too, to access information, discover new teaching ideas and even obtain free worksheets and lesson plans from open resource sites (Aslan & Reigeluth, 2011).

The development of Web 2.0 technology offered interactivity and collaboration opportunities, whereby users could "create, edit, manipulate and collaborate online" Handsfield et al., 2009, p. 40), as well as take ownership of their own learning, and contribute to the increasingly open-sourced nature of knowledge (Cormode & Krishnamurthy, 2008; Handsfield et al., 2009). Web 2.0 has spawned a cultural communal intellect, whereby contributors can access and add to an ever-expanding sea of digital information, with the potential for a global scaffolded understanding process (Hazari et al., 2009); a process which speaks to the social constructivist

theory of learning. Blogs[4], wikis[5], and audio/visual podcasts[6] are examples of platforms through which learners can collaborate and share knowledge and understanding (Aslan & Reigeluth, 2011; Berk, 2010). Blogging, for example, offers opportunities for reflection about learning, a critical higher order skill that is imperative for learners to develop (Li et al., 2013). Teachers are also turning to social media networks, such as Facebook and Twitter to engage learners in their own learning (Fewkes & McCabe, 2012). These new avenues for knowledge construction result in adapted roles for teachers too. Teachers can watch over and assist learners through the process of creation, within the classroom as well as after hours, and offer continual, learner-specific feedback instead of merely receiving a finished product for assessment (McCusker, 2013).

The opportunity offered by Web 2.0 to construct understanding through collaboration and creation means that learning is no longer restricted by set learning times, but is rather measured through the attainment of learning goals (Aslan & Reigeluth, 2011). This means that instead of teaching the same content to a class of learners at once, each learner is able to master a task at his or her own pace.

Web 3.0 in education has focused on the customisation of learning for individual learners (Aslan & Reigeluth, 2011). Summit Public Schools, a collection of high schools in the San Jose, California region of the United States, has documented the piloting of individualised learning programmes designed to address learners' distinct educational deficits (Childress & Benson, 2014). Teachers of the Summit organisation approached Khan Academy (a non-profit organisation that specialises in the presentation of mathematics and science video tutorials) to adapt individualised learning plans for its learners, which resulted in improved academic results and autonomy in learning (Childress & Benson, 2014). Individualised programmes should, according to Kurilovas, Kubilinskiene and Dagiene (2014), consider the content to be learnt, learning aims of the particular learner, the context of the virtual learning environment, as well as the specific learning methods utilised

[4] A blog is a personalised website that offers writers the ability to share ideas and communicate over the internet (Shih, 2010).
[5] A wiki is a type of website that relies on collaboration by several viewers to contribute to collaboratively created bodies of knowledge (LeBar, 2014).
[6] A podcast is a (visual or audio) recording that is uploaded to the internet for viewers to watch/listen or download to play on personal audio device (Dlott, 2007).

by the learner in order to design a programme that will best facilitate a learners' education.

Although there is evidence, such as in the case of the Summit Public Schools projects, of educational institutions that have experienced success in integrating technology into the classroom, experts warn that the process is gradual and must be continually revised and reformulated to consider the particular context of the institutions (Bernatek et al., 2012; Giannakos & Lapatas, 2010). This begs the following question, which forms the crux of this research: To what extent do schools in South Africa integrate technology in the classroom, and what effect does this have on learners' learning processes? The following section will investigate the state of learning technology in the South African context.

2.5.5. Learning technology in South Africa

ICT (Information and Communications Technology) is widely regarded as the key to socio-economic development, and has been hailed as the catalyst for countries' efforts to meet globalisation (Muchie & Baskaran (2006). According to the 2013 report of the World Economic Forum's Networked Readiness Index (a measure used to explicate the extent to which a country can compete against other nations to realise the opportunities offered by technology in a digitalised age), South Africa falls in 70th place out of 144 countries (Bilbao-Osorio, Dutta & Lanvin, 2014), down from 34th place from a field of 104 in 2003 (Dutta, Lanvin & Paua, 2004). The report provides a useful indicator of countries' technological competence (Mentz & Mentz, 2003), and considering South Africa's low (and falling) position in this ranking, it would appear that the country lags behind other nations in technological awareness.

Extensive research by Research ICT Africa (RIA) has indicated that although ICT has shown development within South Africa, particularly in the mobile telecommunications market, nationwide access to digital technology has been hampered by high costs when compared to international and African standards (Bilbao-Osorio et al., 2014; Gillwald, Moyo & Stork, 2012). Technology integration into schools, as a result, has been a slow process (Isaacs, 2007; Mdlongwa, 2012). According to an RIA study conducted over the 2011-2012 period, 22.8% of South African survey participants had used a computer at school or university, whilst 27.6% browsed the internet on mobile phones (Gillwald et al., 2012). The 2011 National

Education Infrastructure Management Systems (NEIMS) report revealed that out of 25,870 schools surveyed in South Africa in 2011, only 24% of schools nationwide had computers for teaching and learning; 79% of Western Province schools surveyed and 63% of Gauteng schools had computers for teaching and learning, whilst the Eastern Cape and Limpopo Province only indicated 10% of those schools surveyed as having access to such digital tools (Department of Education (DoE), 2013). These statistics highlight the digital divide experienced nationwide between those with access to technology and who are able to harness the opportunities offered by it, and those who have barely heard of such technology (DoE, 2003; Fuchs & Horak, 2008; Bovée, Voogt & Meelissen, 2007; Mdlongwa, 2012; Cantrell & Visser, 2011).

In a bid to address the implementation of learning technology in education, the Department of Education together with the Department of Communication produced the Strategy for Information and Communication in Education to advance the status of learning technology in South Africa in 2004 (Isaacs, 2007). The task team developed the much-needed White Paper on e-Education and Guidelines for Teacher Training as well as the Professional Development in ICT and Training policy, which were to delineate the integration of technology into schools as well as the skills sets required by teachers to effectively utilise technology for teaching and learning (Cantrell & Visser, 2011; Vandeyar, 2013). However, according to Vandeyar (2013), these policies have failed to provide direction in a few key areas; explanation of the nature of support required from national, provincial and district level to effectively implement technology integration; inadequate focus on educating teachers how to successfully utilise technologies that have been afforded to them, as well as the delineation of the adaptation processes required to meet international education standards whilst still considering the South African context. As a result, schools have developed their own “communities of practice” (Vandeyar, 2013, p. 253), collaborating with nearby schools and organisations to create their own policy that works for the particular organisation. In a study conducted by Govender (2013) involving 1,222 high school teachers from the Kwa-Zulu Natal region, the majority of teachers emphasised the advantage of technology as a tool to enhance their current teaching practices. However, in order for technology to be used effectively in education, teachers noted the importance of addressing “structural, pedagogical and

curriculum" innovation (Govender, 2013, p. 563). Many schools turn to e-integration projects funded by South African organisations to address the technology integration challenges and digital divide experienced between the different socio-economic groups and their access to technology (Cantrell & Visser, 2011). Examples of such projects are E-Schools Network, the Khanya Project, New Partnership for Africa's Development (NEPAD) e-Schools Initiative and SchoolNet South Africa (Isaacs, 2007).

The International Society for Technology in Education (ISTE) has developed standards for the integration of technology into schools, to which many developing nations such as South Africa have subscribed (Mentz & Mentz, 2003). These include incorporating learning technology into learning and assessment, teachers' demonstration of the proficient use of technology, consideration of digital literacy education practices, teachers' engagement in technological professional development, and (a standard which speaks to the heart of this research) creating engaging, creative learning experiences with technology (ISTE, 2008). These standards are in line with the Department of Education's goal for every learner in South Africa to be "ICT capable", with a competency to use ICT in society by 2013 (DoE, 2003, p. 19). Is this a case of another policy without clear indications of how to properly utilise the technology for teaching and learning?

The obstacles described in 2003 by Mentz and Mentz as preventing successful technology integration into schools are not much different from those experienced in 2014; inadequate financial contribution by the Department of Education, insufficient teacher training, poor electricity provision, low economic status of the surrounding community, inadequate classroom space and security, and unfavourable teacher-learner ratios (Mentz & Mentz, 2003). Vandeyar (2013) indicates that the lack of leadership by school management bodies to facilitate a culture of embracing learning technology into education has resulted in resistance of the movement by teachers. In consideration of the above, it becomes clear that the case of learning technology integration into South African education is rather a contested issue at present.

2.6. CONCLUSION

In an era of extensive technological innovation, various forms of learning technology are integrated into classrooms in different regions of the world with varying speed

and acceptance. In order for technology to be embraced in contemporary classrooms, it would appear that several considerations need to addressed; from international and national legislation and implementation down to the creation of optimal learning experiences for learners, towards whom education is ultimately geared, and whose voices are left largely unheard in literature regarding technology integration into education. As such, research such as this study can afford insight into learners' perception of the role that technology could play in motivating optimal learning.

In the following chapter, the research paradigm and methodology utilised in this research study will be described.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

In this chapter, the research framework is informed by research design and methodology used in this research. It is imperative to understand the relationship between the design and methodology proposed for the study, as well as how they team together to address the research questions posed. According to Kumar (2011), the research design enables the identification of and arrangement for various research procedures to occur so as to ensure that reliable and valid answers address the research questions posed. Such procedures that make up techniques of data gathering and analysis will be discussed, as well as important considerations to ensure that the procedures do in fact answer the research questions reliably.

3.2 RESEARCH PURPOSE

As indicated in Section 1.1, children in the current education era are born into a world deeply entrenched in the use of technology in day-to-day life (Prensky, 2001). This Net Generation have become au fait with using technology in their homes, and more increasingly, in their schools (Walling, 2012). Teachers and researchers have found that instead of attempting to compete with technology for the attention of learners, technological tools can spark and sustain learner attention, ultimately influencing the motivation to learn both in the classroom and outside of school walls (Palfrey & Gasser, 2008; Condie et al., 2007). However, much of the literature concerning the motivating role of technology in education pertains to developed country contexts, focuses on teachers' reflections of the usefulness of technology in academic achievement, is fairly outdated and as a result, has not deliberated on present forms of technology (Mylläri et al., 2011; Stefl-Mabry et al., 2010; Kinzie & Sullivan, 1989; Moen & Doyle, 1978; Brooks & Shell, 2006; Hancock, 2002; Pajares, 2001). As such, the aim of this research study was to investigate the

conceptualisations of a class of Grade 11 learners in a school in Cape Town, Western Cape, regarding the motivating role that technology plays in their learning.

3.3 RESEARCH QUESTIONS

The study aimed to investigate the motivating role played by technology in learning, according to the conceptualisations of learners. It was important for the researcher to understand and convey learners' experiences of technology used for learning. It was also important to understand how the influence of learners' motivation induced from the use of technology in learning impacted on teachers' perceptions of the motivating effect of technology in the classroom, and how their teaching was influenced as a result. With this in mind, the following sub-questions were posed to guide the investigation of the principle question (as indicated in Section 1.4):

1. What are learners' conceptualisations of the role of motivation for optimal learning?

2. What are learners' conceptualisations and experiences of the role of technology, especially when used within the classroom?

3. What influence do learners' perceive technology to have on their motivation to learn?

4. What are teachers' conceptualisations and experiences with regard to the role of technology in motivating learning?

5. How do teachers' perceptions and experience of technology influence learners' conceptualisation of technology in education?

3.4 RESEARCH PARADIGM AND DESIGN

The research paradigm provides the necessary structure to guide the implementation of the research design. The research paradigm and research design, as well as their implications for this research, are discussed in this section.

3.4.1 Research paradigm

As discussed in Section 1.5, paradigms are frameworks that support particular ways of thinking about the world. According to Hammond and Wellington (2013), the

research paradigm dictates the particular assumptions about and value of knowledge, as well as how researchers endeavour to obtain new knowledge in their research studies. The constructivist paradigm was chosen for this research. This paradigm acknowledges that meaning is not defined by one absolute truth; rather, multiple realties are subjective, personally constructed through interaction with and experience of the outside world (Gray, 2011). Such constructions of meaning are often negotiated with members of a society, and heavily influenced by historical and culturally defined norms or ways of being (Creswell, 2014).

According to Ormston, Spencer, Barnard and Snape (2014, p.17), "The only way to understand social reality is from the perspective of those enmeshed within it." In considering this sentiment, the researcher's reasoning to utilise a constructivist paradigm was to gain an understanding of the meaning of the topic in question, as co-constructed with the learner participants.

The motivation for the selection of the constructivist paradigm will further be explained in the description of the three dimensions of research within a research paradigm, namely ontology, epistemology and methodology.

Ontology: According to Ormston et al. (2014, p. 5), "The social world is made up of representations constructed and shared by people in particular contexts." Thus, in order to discover the ontology of particular research, it is imperative to question the nature of reality that applies to participants in the study. As was indicated in Section 1.3, the topic as understood from teachers' perspectives has previously been researched, however, a research gap emerged that focused on learners' understanding of the topic. It can be argued that learners are products of their environments, produced by their interaction with their environment, influenced by cultural and popular practices, level of exposure to technology, and their understanding of learning. The Net Generation (as discussed in Section 2.4.2.1) constantly negotiates understanding of technology as it continuously evolves. This research set out to understand the learners' perspectives of the motivating role of technology in education as constructed through their interaction within their context, by listening to learners' musings of their subjective interpretations of reality.

Epistemology: The nature of how understanding and knowledge is born, as well as the consideration of the relationship between the researcher and the phenomenon

being researched, delineates the epistemology (Denzin & Lincoln, 2011; Hammond & Wellington, 2013). Learners make meaning of their realities by experiencing and interacting with their environment differently, the very process of which affects the nature of their understanding, and as such, the interaction with their environments must be considered in this study. It is also imperative to consider how the researcher comes to construct understanding based on interaction with the participants within this research study and conclusions drawn as a result thereof, as well as those considerations of reality prior to commencement of the study, as previously experienced and acquired through the literature review. This process demands perpetual reflection of the role of the researcher, as well as of how the continuous restructuring of the understanding of reality may affect the nature of such research conducted (Lichtman, 2013).

Methodology: The manner in which an understanding of the phenomenon in question is obtained is referred to as the methodology (Denzin & Lincoln, 2011). In order to investigate learners' understanding of the motivating role of technology, the researcher thought it essential to utilise a number of methods to gain an understanding of the participants' constructions of their realities. Methods used to gain access to participants' realities will be discussed in Section 3.5.

3.4.2 Research design

According to Creswell (2014, p. 3), the research design refers to the "procedure of enquiry" undertaken so as to explore the phenomenon at hand. Maxwell (2013) describes the five considerations of a research design, which, whilst providing structure to the research process, afford the flexibility required for a qualitative study. The five considerations (also schematically represented in Figure 3.1) are as follows (Maxwell, 2013, p. 4):

- Goals: The aim of the research study, which probe the question, "Why is your study worth doing?"
- Conceptual framework: The theoretical values and previous research which directs one's research.
- Research questions: Questions designed to probe the researcher to ask, "What, specifically, do you want to better understand about the setting or participants that you are studying?"

- Methods: The enquiry into the procedures and instruments appropriate for collection and analysis of research data
- Validity: The requirement of the researcher to engage with the research from a reader's perspective and question the credibility of the results obtained.

The researcher has added to this model the consideration of *context*, which describes the situation of the research study, deemed necessary so as to orientate and ground the research to a particular reality, as indicated by Terre Blanche and Durrheim (2006). As this is a qualitative study, it is important for the researcher to continuously reflect on such considerations so as to accurately portray the conceptualisations of the research participants.

A critical discussion regarding the various components of the research design, as well as how they were addressed in this research, will now be addressed.

Figure 3.2: Schematic representation of the research design (adapted from Maxwell, 2013, and Terre Blanche & Durrheim, 2006).

3.4.2.1 Case study

Qualitative research aims to investigate the meaning and reality behind particular phenomena. The case study can provide an in-depth investigation into a particular, specific example of the phenomena, within its natural context (Rubin & Babbie, 2014; Swanborn, 2010). Bounded case studies are specific in that they are "clearly identifiable and limited in scope" (Jones, Torres & Armino, 2014, p. 96), in terms of the number of participants and/or the length of observation into a single example of the phenomenon (Merriam, 2009). In the case of this research, the single case study was viewed as the most fitting design as the motivating effect of technology on a

single Grade 11 class within one Western Cape high school (a bounded system) was to be investigated so as to produce rich contextual understanding of one system.

Case studies offer the opportunity to conduct an in-depth investigation into one example of a phenomenon, utilising a variety of methods to gather a large body of data (Rubin & Babbie, 2014). However, as in-depth an investigation that case studies may offer, Swanborn (2010) indicates that the possibility of generalising the findings of one case to meet the reality of other similar cases is limited. Nevertheless, whilst the dependability of the research may be low, there is still a high measure of credibility in the findings to develop a model to explain the phenomenon in question (Swanborn, 2010). While single case studies focus on developing an understanding of the phenomenon at play in one context, this research looks to extend this understanding to provide further research into the investigation of the role of technology in education.

3.5 RESEARCH METHODOLOGY

As indicated in Section 3.4.1, research methodology refers to the manner in which an understanding of the phenomenon in question is obtained (Denzin & Lincoln, 2011). Unlike the focus on generalising statistical data to a general population within quantitative research, qualitative research is concerned with the investigation of the "attitudes, behavior and experiences" of the human beings behind the research participants (Dawson, 2011, p. 14). According to Braun and Clarke (2013), qualitative research opens up the scope to include the authentic, multiple experiences of real people, resurrecting them from faceless statistics.

Ethnographic research affords the researcher the opportunity to interact with the lived experiences of participants, engaging with their culture, traditions and beliefs so as to co-produce research into the phenomenon in question (Dawson, 2011). Within case study research, rich data is obtained by utilising a comprehensive methodology so as to entertain a holistic interpretation of the topic being studied, within the context and scope of the research (Thomas, 2011). In the same vein, in order to develop *verstehen* (the German word for 'understanding' [Stake, 2010]) of the lived experiences of the participants, the methodology should direct the use of research methods that will enable an in-depth inquiry into the experiences of learners within the bounded system of a research case study. Whilst this research uses some

methods that are traditionally reserved for quantitative or mixed method research, it is important to note that such methods provided the necessary contextualisation that was required to complement and direct the focus of the participants in order to ensure that the research questions were answered. Such methods provided the backdrop against which the qualitative research into the lived experiences of the participants could be realised and fully appreciated. Further considerations of such decisions are delineated in Section 3.6.

As the success of a case study design largely depends on the selection of the most appropriate case for the research requirements (Lodico et al., 2010), it is imperative that such a case is closely examined so as to fully understand the implications of the findings for that particular case.

3.5.1 Research contextualisation

In order to understand the value of such research, Lodico et al. (2010) explain the importance of placing the study into context; delineating the school setting and outlining the role of the researcher in the study. These considerations are outlined in the following sections.

3.5.1.1. The school setting

The school that constitutes the case study is a private school encompassing pre-preparatory (ages 3-6), preparatory (grades 1 to 6) and high school (grades 8 to 12), and services a middle-/upper class suburb of Cape Town in the Western Cape. The high school, pre-preparatory, and preparatory phases are located in different areas of the school grounds, and are governed by separate principals. There are currently 587 learners in the high school phase and 128 learners across the five Grade 11 classes. The small class sizes enable teachers to provide more intensive individual and small group facilitation.

This particular school was chosen because it was accessible to the researcher, the school was willing to accommodate the research study, and is extensively equipped with technology to support teaching. At the time of research, this particular school had just begun to engage in an iPad[7] introduction pilot within the high school, which

[7] The iPad is a brand of handheld tablet computer designed by Apple Incorporated.

meant that technology was a 'hot topic' of conversation between teachers, parents, governing body, and learners. It was also assumed by the researcher that there may be a likelihood that learners would have had long-term exposure to technology when considering the affluent suburb that the school services.

One Grade 11 class was approached to gain an understanding of the motivating effect of technology in education. The class is made up of participants between the ages of 16 and 17 years of age, who are instructed in English. Each learner has a unique learning area portfolio, tailored to their own learning area choices. Whilst learners are members of an overarching Grade 11 class, they are also members of learning area classes as a result of the learning area choices that they have made.

As Hennink (2014) advises, focus groups should be conducted in a comfortable, familiar location where participants can feel secure and comfortable to share their views with the group. As such, the focus group was held within a classroom familiar to the learners within break time, and snacks were provided in a gesture of trust and rapport-building.

The chosen Grade 11 class was firstly provided with questionnaires to complete, and from the 21 participants who returned the questionnaire, four female participants and four male participants made up the focus group, based on their rich perspectives that they could offer to the focus group (Braun & Clarke, 2013).

The focus group was transcribed by a scribe, who completed a consent form so as to protect the identities of the participants (see Addendum J).

3.5.1.2. The role of the researcher

This research study is framed by the constructivist paradigm, and as such, participants' constructed interpretations of the research phenomena are vital to the study. At the same time, acknowledgement of the researcher's constructions is equally important. The researcher is not a passive observer of social interaction, but plays an active role in such qualitative work. Researcher and participants work together in an equal partnership; whilst the participants bring unique perspectives to research, the researcher strives, in a collaborative manner, to direct such understandings so as to answer the research questions (Merriam, 2009). This requires the researcher to be reflexive, that is, "to acknowledge how [the

researcher's] own experiences and contexts (which might be fluid and changing) inform the process and outcomes of enquiry" (Etherington, 2011, p. 31-32). Therefore, it is important for the researcher to continuously be cognisant of factors that could influence both the research process and results, such as "biases, values, and personal background, such as gender, history, culture, and socioeconomic status" (Bergmark & Kostenuis, 2011; Creswell, 2014, p. 117). Techniques utilised to minimise such bias are discussed in Section 3.7.

According to Lodico et al. (2010), the relationship and level of interaction between researcher and participants is anticipated to be fairly close in qualitative research, which poses interesting consequences of which the researcher must take note. Whilst acknowledging that the researcher's presence can influence the group dynamic as well as the nature of the information divulged (Creswell, 2014; Etherington, 2011; Bergmark & Kostenuis, 2011), the researcher must act as a vessel through which the perspectives of the participants can be represented. For participants to be able to provide authentic perspectives, a trusting environment needs to be established, complete with strategies put in place to ensure that above other ethical considerations, participants are guaranteed privacy, confidentiality and anonymity. For a description of the techniques utilised to establish such trust, please see Section 3.8.

A qualitative research study would not be possible if not for the perspectives of participants who, with the researcher as co-constructor, enable the investigation into a research topic. By specifying the participant criteria, the researcher is able to recruit participants to join him or her on a unique research journey.

3.5.2 Participant selection and selection criteria

Qualitative research largely seeks participants who can add in-depth conceptualisation of the phenomenon, and as a result, the selection of such participants is usually not a random endeavour – they are specifically chosen for their ability to add depth and breadth to qualitative research (Flick, 2012; Bryman, 2012). Such participants make up the sample of people within a population, who, to a certain extent, exhibit characteristics of such a population (Thompson, 2012). However, the goal of qualitative research is not to be able to generalise the findings to a larger population, but rather to investigate inter- and intra-personal phenomena

that influence the research topic in question, accepting that similar findings with similar samples may not exhibit similar results due to varying experiences and characteristics (Dawson, 2011).

This research utilised non-probability, purposive sampling to discern participants who were able to aid the researcher in comprehensively addressing the research question, due to their experience and expertise in the research topic (Bryman, 2012). According to Jones et al. (2014), sampling occurs on two levels: selection of the case and selection of the participants within the case. Sampling criteria used to choose the school for the case study were based on accessibility and the extensive use of technology in the particular high school for teaching and learning. The requirements of the class selection were that learners were in high school, and were in a class stream with subjects that lend themselves to the utilisation of technology in the classroom. Learner participants were to be frequent users of some forms of technology (both in school and in at home) in order to qualify for inclusion in the sample. This ensured that they would have the experience to be able to engage in the study from a place of knowing (Braun & Clarke, 2013), whilst teacher participants were considered for selection if they frequently employ technological tools in their teaching (Turnure Pickens, 2007). The principal was asked by the researcher to choose one Grade 11 class that he felt studied subjects with teachers who utilised technology on a regular basis for teaching and learning; as such, access to the learners of this class and their teachers was initiated by the principal as gatekeeper to aid the researcher. Both teacher and learner participants received informed consent letters, and those who returned the signed letters constituted the pool of potential participants for the study (Turnure Pickens, 2007).

A Grade 11 class made up the “units of inclusion” (Bryman, 2012, p. 418) as participants who, owing to their age, belong to the Net Generation of digital exposure and affinity (Prensky, 2001; Palfrey & Gasser, 2008). These participants had already been exposed to 11 years of schooling, four of which were specialised within certain learning subjects that, according to literature, typically utilise technology for teaching and learning (Wilson, 2013; Rice, 2012). In consideration of the above, these learner participants were purposefully selected to provide rich data to broadcast the student voice concerning motivation and technology which is largely missing in discussions of learning technology pedagogy (Geer & Sweeney, 2012).

3.6 RESEARCH METHODS

According to Braun and Clarke (2013), qualitative research is not concerned with the orderliness of numbers and structure; it seeks to capture and interpret "the messiness of real life" (p. 20). Within social constructivism, the researcher is the vehicle through which the context and multiple realities of the participants are investigated (Lodico, et al., 2010). Therefore, it is imperative that the researcher chooses methods that will enable participants to share their experiences to provide rich, contextual information to the research.

3.6.1. Data production techniques

Learners make meaning of their realities by experiencing and interacting with their environment differently, the very process of which affects the nature of their understanding, and as such, the interaction with their environments must be considered in this study. Therefore, in order to investigate learners' conceptualisations of the role of technology in motivating learning, it is important to investigate the extent of the interaction with technology that learners have experienced prior to the research study which could inform their current conceptualisations thereof.

3.6.1.1 Questionnaires

According to Rowley (2014), questionnaires refer to "documents that include a series of open and closed questions to which the respondent is invited to provide answers" (p. 308). Questionnaires which include such open and closed questions are not typically included in the qualitative researcher's data collection techniques, but according to Braun and Clarke (2013), can provide invaluable information on participants' "experience, understandings, and perceptions" regarding the topic in question (p. 137). In addition, a combination of open- and closed-questions in a questionnaire can be useful in determining response patterns, as well as aiding in the investigation of participants' answers as indicated by them, enabling the researcher to acknowledge the participants' frame of reference whilst still gaining a wealth of information (Braun & Clarke, 2013). Two questionnaires were designed for this study. The learners' questionnaire (see Addendum F) was designed to obtain demographic information, to discover which various types of technology are used in

and out of school and investigate the level of perceived competency learners experience when utilising various technology tools. The data collected from the learner questionnaire enabled the researcher to recognise which technology tools were familiar and were regarded as valuable to the participants, as well as the level of familiarity of technical jargon that had the potential to emerge in and inform the focus group. The learners in the Grade 11 class that made up the case study unit (26 learners in total) were all given the same questionnaires to complete individually; 21 questionnaires out of 26 were completed and returned.

The teachers' questionnaire (see Addendum G) was designed so as to understand how teachers' perspectives of motivation and technology informed those of the learners, as well as directed their teaching practice. It was considered that teachers witness and engage in learners' daily interactions with technology at school, and their insights into this interaction could provide an interesting dimension to the research. This questionnaire asked biographical questions to investigate teachers' teaching experience, their perceptions of the concepts 'learning' and 'motivation', their preferred teaching styles, the access they afford their learners to technology within their learning areas, their training and perceived competency in using technology, as well as general opinions regarding technology used for education. These questions provided information that was useful to contextualise teachers' experience of technology and learning, the access to technology that they afforded to their learners, as well as the influence that their conceptualisations of both motivation and technology may have on their way of teaching. The questionnaire was provided to 12 teachers and 6 questionnaires were completed and returned.

With regards to designing questionnaires, Rowley (2014) provides useful guidelines so as to generate questionnaires worthy of producing useful data. Considerations included the utilisation of language that is appropriate to the audience; ensuring that the questions do not convince participants to answer in a particular direction or with 'yes/no' or vague answers, as well as the utilisation of questioning which does not encroach on participants' privacy (p. 314-315).

3.6.1.2 Focus group

Within focus groups, "data are collected from *multiple* participants at the same time" (Braun & Clarke, 2013, p. 108). The group gets its name as the discussion is

focused on a particular topic that the researcher wishes to investigate. This method of data collection was deemed the most appropriate for the study for a number of reasons. Firstly, focus groups provided the researcher with an interpretation of the phenomenon under question from the perspective of the learners themselves (Hennink, 2014). As such, the researcher's interpretation is somewhat directed in favour of the learner perspective, as was the aim of the research, as described in Section 1.3. Secondly, focus groups encourage participants to engage in conversation with both researcher and fellow participants, providing deeper perspectives than may have emerged if participants were interviewed on a one-on-one basis (Stangor, 2014; Hennink, 2014). As such, the researcher is called the *moderator* as he/she guides the discussion in a relatively unstructured manner amongst all involved in the focus group (Braun & Clarke, 2013, p. 108). Lastly, the focus group discussion is more indicative of one that would occur in a natural setting; indicating vital information such as the negotiation of meaning (Braun & Clarke, 2013), which is important in the investigation of a social constructivist reading of participant understanding.

Hennink (2014) outlined guidelines to ensure that focus groups generate rich perspectives, which were followed in this research study: 1) It is encouraged to utilise between six and eight participants, selected for their similar characteristics or common experience of the theme in question; 2) questions should be focused on a few themes only to enable time to discuss such themes in depth, so as to develop a variety of opinions on the topic; 3) the moderator should facilitate the process, encouraging participants to converse with each other, as well as explore their responses in more detail; and 4) the environment where the focus group discussion takes place should encourage discussion that is authentic and dissuades intra- and interpersonal judgment.

As part of the "messiness" of qualitative research (Braun & Clarke, 2013, p. 20), the moderator has to be flexible when engaging with participants, sensitive to the multiple realities that may emerge and reconstruct the nature of the research (Lodico et al., 2010). As such, the moderator may begin with a set of initial questions, but must be sensitive to the experiences of the participants, and adjust the questions to the direction that the focus group may take (Lodico et al., 2010). This was

experienced by the moderator of this focus group interview, as many clarifying questions were asked to expand on the information provided by participants.

The interactive nature of the focus group results in a unique set of data. The group dynamics at play largely influence the responses offered by participants (Hennink, 2014). Unlike individual interviews, participants have the opportunity to listen to others' responses and may adapt their responses accordingly, as well as illicit new directions in questioning and answering in the discussion as they interact with each other (Hennink, 2014). On the other hand, participants may feel exposed in front of their peers which may influence the extent to which they feel comfortable enough to divulge their opinion, concerned about the level of confidentiality they can expect from the group (Braun & Clarke, 2013). The participants in this study are adolescents, and as such their fledgling independence is still tied to feelings of insecurity and an egocentric fear of personal judgment (Newman & Newman, 2011), which may influence the way that they respond in a focus group with their peers (see Section 2.4.1.3 for a discussion on adolescent development in society). Such considerations require the moderator to brief the participants of the confidential and non-judgmental requirements of the focus group interview.

3.6.1.3 Pilot study

As indicated in Section 1.8.3, both the focus group interview guide and questionnaires were reviewed by means of a pilot study prior to the administration of the questionnaires and focus group interview. According to Lodico et al., (2010), the pilot study, whereby participants from the sample are invited to test out the data collection instruments prior to their administration, affords the researcher the opportunity to assess the dependability of such instruments.

The pilot studies were instrumental in providing assurance that the data collection instruments were easily understood and did not contain concepts that could introduce the possibility of ambiguity and misunderstanding, or that of *social desirability bias* (Brace, 2013, p. 12-13), whereby participants answer in a manner that they believe is desirable to the researcher. In addition, such a 'test run' afforded the researcher the opportunity to adjust the language used in the focus group interview, as the pilot of the questionnaires revealed that the participants used

various technological jargon which then became an important feature of the focus group interview. As such, the importance of the questionnaires was highlighted as an imperative source of obtaining background knowledge of the capability with which participants possessed to utilise technology.

3.6.1.4 The semi-structured approach

Research structures can fall within the continuum of structured (also called formal and standardised), semi-structured (semi-standardised or guided) and unstructured (or informal) formats, and each type presents opportunities for collecting different data for different purposes (Berg, 2009; Lichtman, 2013).

The questionnaires (see Addenda F and G) were designed to follow the semi-structured approach in order to collect vital information that could inform the construction of the focus group interview schedule. They also provided the researcher with insight into which salient participants would provide thought-provoking insight on the topic within the focus group interview. As such, the semi-structured nature of the questionnaires enabled the collection of important biographical and practical information regarding the use of a variety of technologies, teaching methods and strategies, whilst still affording insight into the lived experiences of the participants (Braun & Clarke, 2013).

The semi-structured approach was chosen for the focus group interview as it ensured that the researcher's main questions were discussed whilst still providing the space for participants to steer the research in an unanticipated direction (Bryman, 2012). The focus group interview schedule (see Addendum H) details a list of pre-determined questions that the researcher intended to ask the participants, including appropriate prompts to encourage participants to expand on their answers.

3.6.2 Data analysis

Grbich (2013) acknowledges that qualitative data analysis is not merely a process that begins with searching for meaning within data once it is collected; the beliefs and values of the researcher, decisions made at the start of the research process regarding the value of knowledge, right down to data collection techniques, as well as the researcher's intention for the research all play a role in how the findings

emerge. This means that decisions made by the researcher as a result of reflection can change the nature of data collection, which ultimately affects data analysis. In this study, the researcher adapted both the questionnaires and focus group interview schedule after the pilot study prompted interpretations of questions that strayed from the intended focus of the research study. The focus group interview schedule was also amended after the questionnaires were received back from the learner participants, so as to direct the focus group discussion after consideration of the participants' experience of technology engagement. As such, the ability of the researcher not only to be reflexive in terms of her influence on the research process (as indicated in Section 3.5.1.2), but also to the ever-changing needs of the study becomes apparent (Schreier, 2012).

As indicated in Section 1.8.4, qualitative content analysis was used to analyse both the questionnaires and focus group transcriptions. A description of and rationale for using the method is explained in the following section.

3.6.2.1 Qualitative content analysis

Qualitative research is not a straightforward process in that it produces a large amount of data from which the researcher must attempt to create structure and recognise patterns and relationships between various constructs (Hennink, 2014; Grbich, 2013). As a result, the task of qualitative data analysis, according to Boeije (2010), involves "segmenting the data into parts and reassembling the parts again into a coherent whole" (p. 76). Content analysis (as discussed in Section 1.8.4) was viewed as a suitable method for making sense of such data, as it enables the structuring of data into various themes that can be scrutinised.

As indicated in the previous section, a degree of flexibility on the part of the researcher was required so as to obtain the necessary data. Once the questionnaires used in this research were piloted, and upon initial analysis of the data obtained, some of the wording of the questions within the questionnaires was changed. Following transcription of the questionnaires, the focus group interview schedule was also amended. Upon completion of the focus group interview, this data was then transcribed verbatim. Both questionnaire and focus group transcripts were re-examined to construct a holistic understanding of the data, upon which a range of themes became evident, which could then be reduced to codes, which according

Braun and Clarke (2013) refer to brief expressions that encapsulate “the essence of why you think a particular bit of information may be useful” (p. 207). This initial discovery of coding through preliminary transcript familiarisation is called open coding, and enables the researcher to begin to recognise codes rather than direct a narrow focus of official findings (Berg, 2009). Such codes should be treated with flexibility as they begin to redefine as further themes and patterns emerge. Memos of the researcher’s thoughts when reading through the transcripts can also help to develop codes and establish relationships between themes, and were utilised in this study (Grbich, 2013; Bernard & Ryan, 2010). Please refer to Addenda K, L and M to view the transcription, coding and categorisation of the focus group interview, as well as learner and teacher questionnaires respectively.

The next step in content analysis is reworking the codes that have been teased out in the preliminary open coding process into more formal codes, an inductive process that involves reducing raw data to identifiable patterns that can be explained in a discursive format (Bernard & Ryan, 2010). These formal codes are then grouped into categories, which are essentially, according to (Schreier, 2012), “aspects on which you want to focus your analysis” (p. 59). In this research, such themes were colour-coded on the transcripts, and then segregated into categories according to colour, which enabled the researcher to recognise patterns that could be categorised.

To guide the process of open and formal coding and categorization, Henning, Van Rensburg and Smit (2004) remind researchers to consider how the categories relate to one another, how they are informed by the literature, as well as what is relevant and irrelevant information to the study. This indicates that content analysis is not a linear process, but rather transformative and dynamic as themes emerge and are established (Braun & Clarke, 2013). After reflecting on such questions, themes could be established that could satisfy the research questions, as detailed in the research findings. The reader is referred to Figure 3.2 to engage with the schematic diagram which details the process that was followed in order to conduct content analysis in the research study.

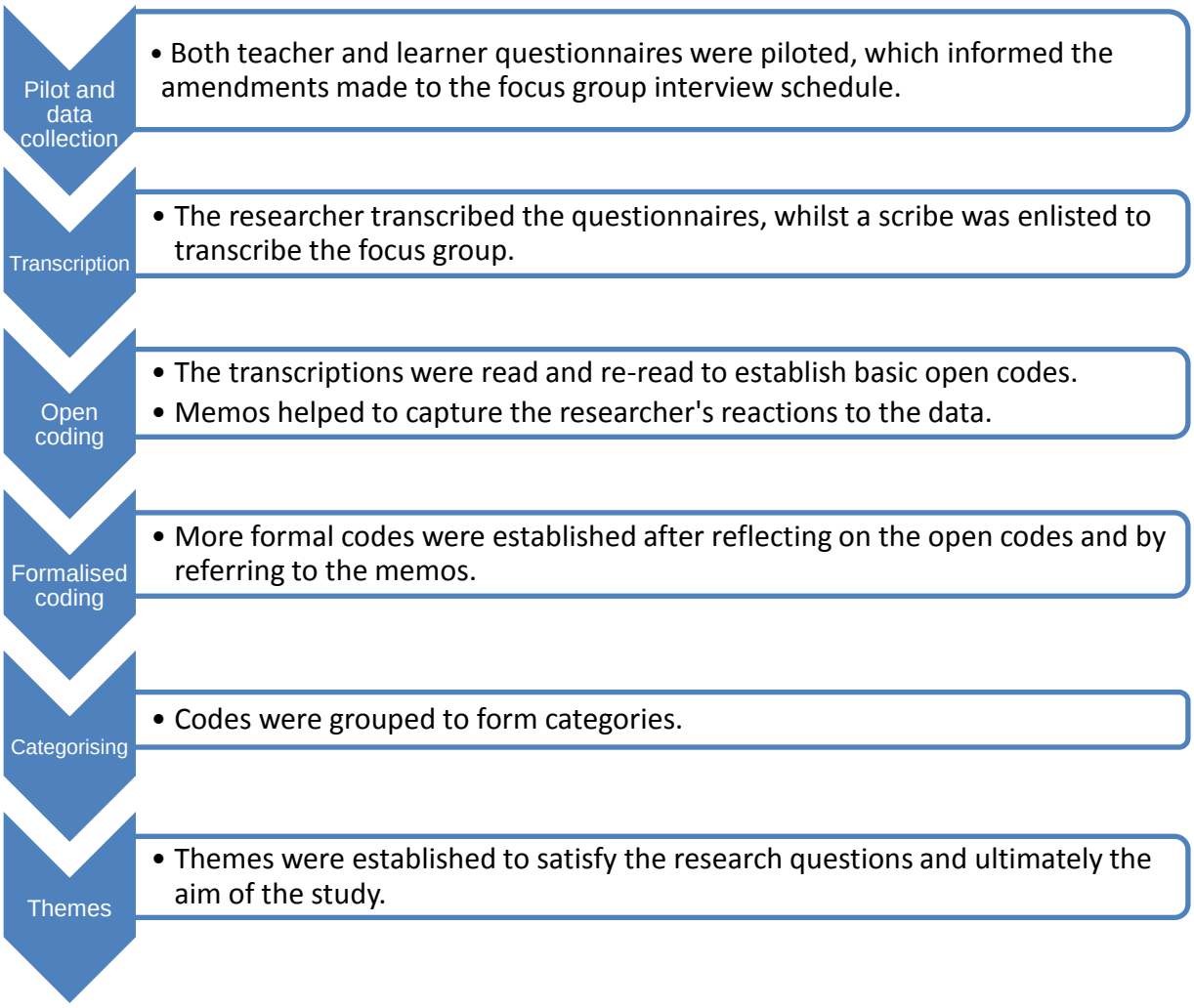

Figure 3.2: Schematic representation of the data analysis process utilised in this study (It is important to note is that the process was not a linear one, but bi-directional, as process steps were frequently revisited)

3.7 DATA VERIFICATION

Qualitative research can provide valuable insight into the manner in which people construct their lives within a cultural society (Merriam, 2009). In order to preserve the significance of such research, it is important for researchers to be transparent in their conduct, affording fellow researchers the opportunity to assess whether an accurate portrayal of the researched topic was represented, and therefore, whether the study can be considered credible (Marshall & Rossman, 2011; Shenton, 2004). Validity and reliability are typically terms used in quantitative research to describe the

trustworthiness of data, but Silverman (2011) notes the complications of using such positivistic terms when explaining research that involves interactions with human beings. As indicated in Section 1.9, Lincoln and Guba (1985) detailed four strategies that are used in contemporary research to ensure that research can be judged trustworthy. Such tactics, as well as how they were implemented in this research study, will be discussed in the section below.

3.7.1 Credibility

The social constructivist paradigm utilised in this study holds the social voice of research participants in the highest regard. The researcher is a vessel through which the lived experiences of participants can be shared. As such, the extent to which the researcher is able to depict the accurate experiences of the research participants is referred to as credibility (Lodico et al., 2010).

Marshall and Rossman (2011) suggest "triangulation, member checking, peer debriefing, intercoder reliability, audit trails and theoretical sufficiency" (p. 221) as techniques available to address research credibility. In this study, the learner questionnaire was designed so as to explore the learners' prior conceptualisations of the topic, whilst the teacher questionnaire provided valuable outsider witness and verification to the perspectives offered by the learners. These methods produced valuable considerations for the structuring of the focus group interview, and as such, these multiple methods provided important credibility to the study. The teachers provided essential prolonged observation of the learner participants that was missing from the researcher's limited access as dictated by the scope of the research. In addition, it was important for the researcher to garner authentic reactions from the participants; therefore the researcher ensured the participants of their rights and confidentiality, spent time establishing rapport and ensured that the participants felt comfortable and secure enough to offer honest opinions. Verification of the researcher's accurate capturing and understanding of opinions was sought at various points in the focus group, and the participants were offered transcriptions of the interview to peruse and comment on the accurate capture of their perspectives, thereby utilising member-checking. To practice peer debriefing, the researcher consulted with her supervisor and other knowledgeable experts throughout the study to verify her reactions and control personal reactions which could introduce bias to

the findings. Finally, an audit trail was maintained so as to verify the steps taken to conduct transparent research as suggested by Marshall and Rossman (2011), and can be found in Addendum I.

3.7.2. Dependability

Equivalent to the concept of reliability utilised in quantitative research, dependability, as the name suggests, refers to the extent to which the results fairly and reliably represent the data captured (Merriam, 2009). It refers to the extent to which the research procedures followed are reliable; that is, if followed in a study with similar variables, similar results could be expected (Babbie, 2010; Lodico et al., 2010). However, due to the researcher's role as co-constructor of knowledge and the subjectivity of participants as afforded by the social constructivist framework, it must be considered that it is not possible to obtain precisely the same results should the study be replicated with equivalent methodology, participants and context (Shenton, 2004). Nevertheless, the researcher should be concerned with detailing the research journey as far as possible to enable further researchers the opportunity to hold such results credible (Merriam, 2009).

In this study, the researcher detailed each step of the data collection as well as analytic procedure followed, as recommended by Lodico et al. (2010). These steps can be viewed in the schematic representation provided by Figure 3.2 in 3.6.3.1. As indicated in the previous section, an audit trail documented the research process, both to provide credibility in the transparency of the steps taken, as well as to illuminate the path for future researchers to replicate the journey, as suggested by Marshall and Rossman (2011).

3.7.3 Confirmability

Confirmability is the qualitative equivalent of objectivity, that is, the extent to which the study presents the accurate portrayal of the research findings rather than the personal perspective and interpretation of the researcher (Mertens, 2014). As such, the researcher must continually assess her interpretations of the data for bias and misrepresentation, in a process referred to by Shenton (2004, p. 68) as "reflective commentary." This was performed through the use of reflection upon open coding, through the use of memos and reflexive notes kept by the researcher. To ensure that

the researcher does not misrepresent participants' perspectives, direct quotations of participants' responses were utilised in this study.

3.7.4. Transferability

Also concerned with the trustworthiness of research findings, transferability is the qualitative equivalent of external validity, which refers to the extent to which the results of a study can be generalised to other studies, based on the extent to which the sample is representative of the population (Mertens, 2014). In qualitative research, it is imperative that other researchers and readers are able to assess the extent to which the contexts differ between this and other studies (Mertens, 2014). It thus becomes the task of the researcher to describe the study context so as to enable readers and other researchers to assess the transferability of results to other contexts (Merriam, 2009). In this study, a detailed contextualisation of the school and participant context and selection was provided in Section 3.5, as recommended by Lodico et al. (2010). Information regarding the contemporary adolescent, who makes up the contemporary learner in this research context, is also comprehensively described in Section 2.4.2.

At this juncture, the reader is referred to Figure 3.3, which provides a schematic representation of the four strategies proposed by Lincoln and Guba (1985) to ensure trustworthiness in research, as well as how such strategies were consolidated in this research study.

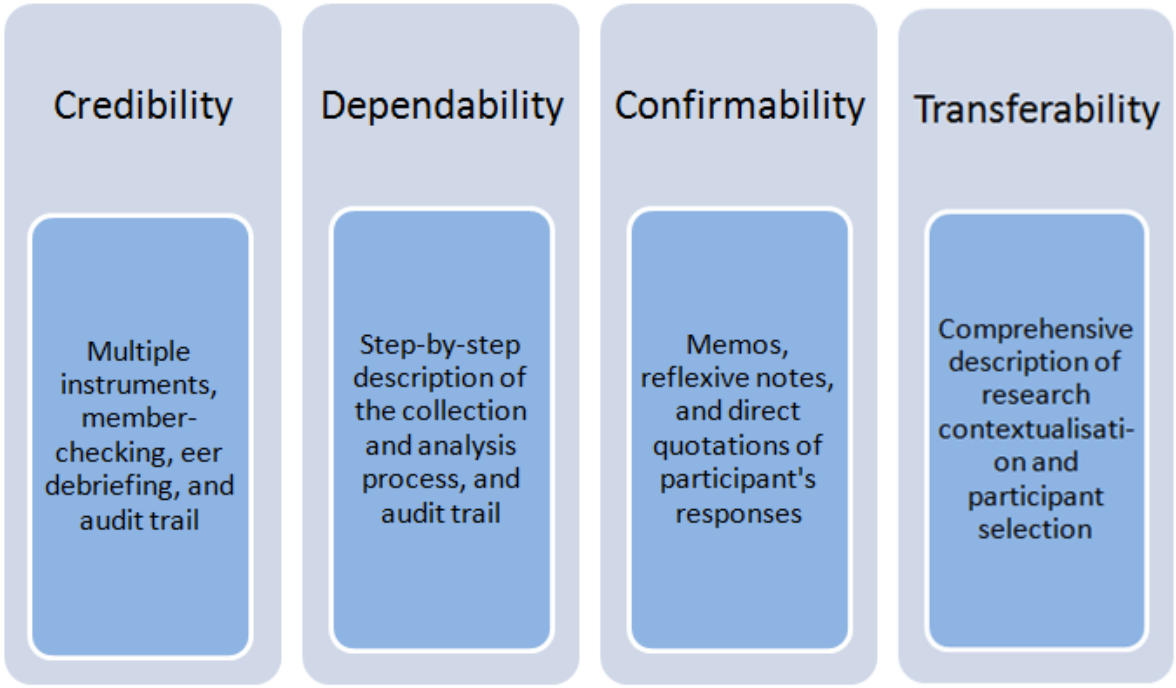

Figure 3.3: Schematic representation of the four strategies that ensure trustworthiness in research as well as how they were implemented in this research study (adapted from Lincoln and Guba, 1985)

3.8 ETHICAL CONSIDERATIONS

According to Maxwell (2013), "ethical concerns should be involved in *every* aspect of design" (p. 7). Clearance for the research study was also sought from the Ethical Committee of the Division of Research Development of Stellenbosch University to ensure that ethical guidelines were adhered to. Ethical clearance was obtained and this study was given the clearance code REC-050411-032. The ethical clearance form is attached as Addendum B. Although ethical clearance provides initial guidance in ethical considerations, it is ultimately up to the researcher (from the initial stages of research) to develop consideration of participants' rights, anticipation of potential violation of such rights, and adherence to accepted ethical principles (Webster, Lewis & Brown, 2014).

Punch (2014) outlined four ethical principles for qualitative researchers to follow, which were considered in this research: Beneficence, non-maleficence, trust and autonomy. The fifth principle of integrity was also consulted as indicated by Braun

and Clarke (2013), which speaks to the development of an ethical conscience. These principles will be discussed in the following section.

3.8.1. Beneficence

According to Punch (2014, p. 49), *beneficence* refers to the practices followed that ensure that research is performed for the greater good; providing important strides forward in research, and in people's lives. This research is proposed to provide essential information regarding the place of technology within schools, a topical concern at present as schools wrestle with decisions to followed traditional teaching or joining digital pursuits to 'technologise' education. Participants in this study reported feeling "part of something bigger" where they could help future children to learn more effectively in schools (informal conversation). As such, it was felt that the participants gained insight into how research is conducted, as well as acquired a sense of belonging and contribution to a greater cause when participating in research, which resonates with Punch's musings (2014).

3.8.2. Non-maleficence

The ultimate participant consideration, as described by Punch (2014), is indicated by the following question: "Does the outcome [of research] justify the burden [placed on participants]?" (p. 50). This refers to a level of reflexivity required by the researcher to ensure that harm does not befall participants, and is referred to as *non-maleficence* (Punch, 2014, p. 50).

It is the researcher's responsibility to comprehensively inform participants of their right to participate and withdraw from the research, the use of research methods within the study, as well as potential risks and benefits that may affect the participants (Punch, 2014; Wassenaar, 2006). As the participants of this study were minors, the legal consent of their parents or guardian was required. As such, all potential participants and their parents received invitations to participate in the study, which included thorough information regarding the nature of the research and participation rights, and informed consent was requested from both the participants and their parents/guardians (see Addenda C and D for the informed consent template for parents and participants respectively).

Permission to conduct the research on site was sought from the principal at the initial stages of the research, and as such, the school was fully cognisant of the research. The school representatives as well as the research participants and their parents/guardians were informed of their rights, and were provided with the contact details of the researcher, her supervisor, and the Department of Research Development should they require further information regarding the study.

3.8.3. Trust

It is imperative not only for the credibility of the research, but also in consideration of participants' well-being, that they trust both the researcher and research process of recruitment, data collection, data storage and use, as well as reporting (Punch, 2014). As such, two principles inform imperative considerations to uphold trust: that of confidentiality and privacy.

Confidentiality refers to the necessity for researchers to assure participants that "…the connection between the individual respondent and the information disclosed will not be made known to third parties by the researcher, nor will it be able to be inferred from the research report" (Punch, 2014, p. 47). As such, participants in this study were reassured, both in writing and orally, at the point of recruitment and continuously throughout the data collection process, of the steps taken by the researcher to honour confidentiality. Within this research study, these steps involved anonymising any identifiers of the participants; securely storing research data collected, which was accessed solely by the researcher, supervisor and transcriber (who signed confidentiality agreements); offering copies of the transcripts to participants to ensure that they could not be identified; and finally, the promise was made to destroy all data following the completion of the study.

Privacy, the "individual's right to control the disclosure of what they deem personal or non-public information about themselves" (Punch, 2014, p.47), was assured at the start of participant recruitment as well as throughout the data collection process. The participants could complete and return the questionnaires to the student affairs officer who stored the questionnaires safely until the researcher could collect them the following day. The focus group interview was held in a familiar classroom and was conducted in a non-threatening, non-judgmental manner, and a group discussion was introduced regarding the participants' views on the importance of

respecting fellow participants and the confidentiality of the focus group, as suggested by Webster et al. (2014).

3.8.4. Autonomy

Part of trust, privacy and confidentiality entails the affordance of autonomy to participants. *Autonomy* refers to the researchers' respect of participants' rights to engage in as well as withdraw from the study (Punch, 2014, p. 55). This concept is crucial for research that engages in the student voice (Morgan & Porter, 2011). As such, although it was necessary to obtain informed consent from parents for their minor children to partake in research (Punch, 2014), informed assent from the participants themselves was still obtained (see Addenda C and D respectively). Participants' rights to privacy were respected – the participants were not pressed for answers in the focus group. Also important to consider in this regard was the gatekeeper's control of access to participants (Punch, 2014). The principal was provided with all of the details of the study, and was free to make the decision to afford the researcher the opportunity to conduct research at the school on the basis of this information.

3.8.5. Integrity

A further ethical consideration, as suggested by Braun and Clarke (2013, p. 42), was that of *integrity*, which refers to the attendance to honesty and accuracy within research – the authentic representation of both fellow researchers' work in the literary review, as well as precision with which the participants' voices are captured. In order to uphold such principles, an audit trail was utilised to track the research processes utilised (see Addendum I); the referencing of fellow researcher's work was continuously reviewed so as to avoid plagiarism; and participants were afforded the transcriptions to assess the accuracy with which their voices were portrayed (Braun & Clarke, 2013).

Figure 3.4 provides a schematic representation of the ethics that were considered within this study.

Figure 3.4: A schematic representation of the ethical considerations for qualitative research as considered within this research study (adapted from Punch, 2014, and Braun & Clarke, 2013)

3.9 CONCLUSIONS

This chapter served to engage with the research design used for this study, which included a discussion regarding the paradigm supporting the research, underlined the rationale behind such a study, described the research methodology, and provided contextualisation of the research setting and participant selection. A description of the researcher's role positioned her within the study, whilst strategies utilised to ensure the trustworthiness and credibility of such an exploration were outlined. Finally, ethical considerations inherent in such research were outlined, as well as a discussion outlined regarding the manner in which such considerations were managed in this research. The following chapter introduces the research findings, accompanied by a commentary of how the data was analysed and themes discovered.

CHAPTER 4

PRESENTATION AND DISCUSSION OF RESEARCH FINDINGS

4.1 INTRODUCTION

This research study aimed to investigate learners' perceptions of the motivating effect of technology in education, so as to gain insight into the value of technology within the South African education system. This chapter will present and discuss the findings of the study, by examining the central themes that emerged from the participants' voices, and will conclude with a summary of the themes presented.

4.2 PARTICIPANTS, SETTING AND PROCEDURE

As delineated in Section 1.8.1 and Section 3.5.2, the participants for this study were purposefully selected according to specific criteria which required them to attend the selected private Western Cape high school, be a member of a Grade 11 class with subjects that utilised technology frequently in its teaching, and be frequent users of technology in a personal capacity. The tools used in this study to collect data comprised of a focus group that was supplemented by two questionnaires (one completed by a class of Grade 11 learners and one completed by their teachers). The learners and teachers had a week in which to return the completed questionnaires, upon which time the focus group was conducted within a secluded, empty classroom that was made available for the study. The reader is referred to Addenda K, L and M for the focus group, learner questionnaire, and teacher questionnaire transcriptions respectively.

As indicated in Sections 1.8.2 and 3.6.1.1, two sets of questionnaires supported the focus group interview to constitute the data collection methods. The learner questionnaire was completed by 21 learners, whilst 6 teachers responded likewise in

the teacher questionnaire. This information was imperative for the study as it provided important contextualisation of the participants' prior knowledge, which helped not only to direct the construction of focus group semi-structured questionnaires, but also to provide insight into the scope of the participants' engagement with technology. As such, this afforded the researcher the opportunity to ascertain the credibility of the participants' knowledge concerning the implications of utilising learning technology for teaching and learning.

In order to protect the identity of the participants, as well as to ensure that they felt comfortable to participate as authentically as possible, the participants were not asked for their names; rather, they were assigned codes in the learner and teacher questionnaires as well as the focus group interview. In the focus group transcription, in Table 4.1, and in the direct quotations of the participants' voices employed in this chapter to showcase their conceptualisations, each participant can be identified with a 'P' (which stands for participant), followed by a number assigned to them (P1 to P8 in the focus groups). The letter 'M' (indicating moderator) is used in the focus group transcript to signify the researcher's role in the focus group, as suggested by Braun and Clarke (2013). Similarly, the learners and teachers who completed the questionnaires will be referred to in this chapter collectively as learner questionnaire participants and teacher questionnaire participants. These participants are described in Table 4.2 and Table 4.3, and their direct quotations can be identified both in the questionnaire transcripts and in Section 4.3, by the letters 'LQ' and 'TQ', followed by a number assigned to each participant (LQ1 to LQ21 and TQ1 to TQ6 respectively).

Any information with the potential to breach confidentiality and anonymity of the participants, teachers, or school as a whole was either deleted or replaced with < > to illustrate that a potential identifier was removed. For example, if a particular learner, teacher, or subject was mentioned, the identifier was replaced with <name>, <teacher>, or <subject> respectively.

The biographical details of the research participants are provided in Tables 4.1, 4.2, and 4.3.

Table 4.1: Biographical data of the focus group participants

Participants	Age	Gender
P1	16	Male
P2	17	Male
P3	17	Male
P4	16	Male
P5	17	Female
P6	17	Female
P7	17	Female
P8	17	Female

Table 4.2: Biographical data of the learner questionnaire participants

Participants	Age	Gender
LQ1	17	M
LQ2	17	M
LQ3	16	F
LQ4	17	F
LQ5	17	F
LQ6	17	F
LQ7	16	F
LQ8	17	F
LQ9	17	F
LQ10	17	F
LQ11	17	M
LQ12	17	M
LQ13	16	M
LQ14	17	F
LQ15	17	M
LQ16	17	F
LQ17	16	M
LQ18	17	M
LQ19	16	M
LQ20	17	F
LQ21	16	M

Table 4.3: Biographical data of the teacher questionnaire participants

Participant	Gender	Years teaching	Learning areas	Grades taught[8]
TQ1	F	5-10	English Home	8-10
TQ2	F	5-10	Afrikaans First	8-12
TQ3	M	20+	History	9-12
TQ4	M	5-10	EMS	8-9
			Accounting	10-12
TQ5	F	20+	Dramatic Arts	8-12
TQ6	F	10+	Mathematics	8, 10, 12
			Mathematics	12
			Natural Science	9

4.3 PRESENTATION AND DISCUSSION OF THEMES

The central themes and categories that emerged from the content analysis form the basis of the findings presented and discussed in this chapter. In analysing the voices of the participants within the focus group and both of the questionnaires, the researcher was able to identify those perspectives that emerged most frequently, group the emerging themes and categories, and analyse the patterns inherent in the data sets. As such, these themes and categories represent the participants' perspectives of the motivating effect of technology in education. The reader is referred to Table 4.4 for an outline of the themes and categories elicited from the data, which provided the framework to discuss the findings of this research study.

[8] The learners are either taught by these teachers currently or were taught by them in previous years.

Table 4.4: Themes and categories from the research data

Themes	Categories
Learners' conceptualisations of motivation	• Definitions and descriptions of motivation • Factors affecting motivation • Learners' understanding of teachers' opinions on the importance of the motivation to learn
Teachers' conceptualisations of motivation	• Definitions and descriptions of motivation • The importance of the motivation to learn
Learners' conceptualisations of technology	• Interpretations of technology • Exposure to and use of technology • The role of technology in education
Teachers' conceptualisations of technology	• Interpretations of technology • Exposure to and use of technology • The role of technology in education

In the following sections of this chapter, the themes that were identified in the research study will be examined and discussed. Key quotations of the participants' voices from the research data are shared so as to detail the participants' perspectives that informed the researcher's presentation of the research findings. A full summary conceptualisation that contextualises the research findings within the social constructivist paradigm is provided in Figure 5.1 in Section 5.2.3.

4.3.1 Learners' conceptualisations of motivation

The combination of participants in the focus group, combined with supplementary information from the learner and teacher questionnaires, provided important insight into learner conceptualisation of motivation. Such scrupulous consideration of the motivation to learn appeared foreign to the participants of the focus group, and as such their definitions and descriptions of the term motivation were born out of a group effort to construct a conceptualisation of the topic.

4.3.1.1 Definitions and descriptions of motivation

First and foremost, it is interesting to note that the participants initially conceptualised motivation as largely an intrinsic effort, indicating individual effort to improve one's own performance, as indicated in the sentiment "pushing yourself to do better" (P5),

without the influence of external influences, such as extrinsic punishment or reward, as shown in P6's expression of motivation that entails effort that is self-driven; "not parents pushing you" (P6).

Further enquiry into the concept of intrinsic motivation revealed a sense of intrigue and curiosity that initially captured learners' attention.

> "It just, like, catches your attention" (P6)

> "Well, when you're interested in it and you wanna know more for yourself." (P5)

> "You wanna know what happens at the end." (P1)

As learners' attention was sparked and captured by the sense of intrigue, the participants reported that they felt drawn into the task, committed to reaching a self-assigned goal.

> "You have no sense of time when you are doing it, then you enjoy it, and you just keep working at it." (P4)

> "Having an end goal that you want to accomplish." (P8)

The participants indicated that the sense of intrigue made the exertion of effort to engage in a task worthwhile, a sentiment encapsulated by P5's response:

> "It's not really a mission to do it, you want to. You wanna spend your time doing that." (P5)

The relationship between task enjoyment and goal-directed behaviour is widely documented (for example, Weiner, 2013; Turnure Pickens, 2007; Deemer, 2004). Similar connections were discovered in an American motivation study[9] (as discussed in Section 2.3.2), which reported that spontaneous interest resulted in goal-directed behaviour as well as subject mastery (Rathunde & Csikzentmihalyi, 1993). Similarly, in a Norwegian study of motivation in high school athletes (also discussed in Section 2.3.2), a positive correlation was reported between the experiences of passion as a

[9] In the study conducted by Rathunde and Csikzentmihalyi (1993), 208 American 17-year- old males and females were surveyed.

result of enjoyment of a task and the willingness to exert effort in said task (Dammyr, 2011). It was evident that participants of the focus group in the current research study were able to pinpoint the value of being motivated in order to learn. This was confirmed in the learner questionnaire, where it was found that almost all of the participants perceived motivation to be vital in order to master a novel concept.

In contrast, the absence of motivation, according to the participants, induces procrastination, task-avoidance behaviour and rushing through the task in order to get it out of the way. P5 was able to merge all of these sentiments, as expressed in the following response:

> "[You know you're not motivated] when you put it aside and you don't put any effort into it ... if you do, you try to get it done as fast as possible 'cause you don't really wanna do it." (P5)

The potential pitfall for such task-avoidance behaviour was realised by P1, who indicated that if a task is rushed, "...you don't learnt anything new," indicating the conceptualisation of effort required for progression, as well as the result when efforts are thwarted. But thwarted by what factors? If the participants were able to indicate such understanding of the potentials and challenges presented by motivation and demotivation respectively, one wonders if they would have insight into those factors that influence such opportunity and challenges. The findings related to this question are explored in the following section.

4.3.1.2 Factors affecting motivation

As previously mentioned, the concept of motivation appeared to encompass conceptualisations of motivation as an intrinsic experience. However, it became apparent that the participants perceived various factors as affecting their ability to initiate such intrinsic motivation. Such factors were described as largely outside of the participants' command, and as such spoke to the elements of extrinsic motivation, as recounted in Section 2.3.2.

As delineated in Section 2.3.4, Covington (1999) discovered, in a study on the motivation of American college learners, that learners view attainment of certain grades as indicators of self-worth. In light of the above study, and after a review of

the literature regarding grade-dependent motivation (as presented in Section 2.3.2), the researcher anticipated that one of the expressed motivators for active engagement in learning would be the anticipation of reward or avoidance of punishment. A sample consisting of four American college classes and their teachers also highlighted such considerations of motivators (as described in Section 2.3.2). It was discovered that extrinsic rewards were often used by the teachers to initiate interest in the task, in the hope that engagement with the exercise would result in intrinsic motivation (Turnure Pickens, 2007). However, in the current study, very few indications were made by the participants regarding the possibility of achieving a particular grade as having either a motivating or demotivating effect (to apply effort to achieve or decrease effort to avoid, respectively). Teachers' efforts to engage the learners were not, however, overlooked by the participants of this study. They indicated that the teachers who paid attention to the format of their lessons, as well as consideration of their intended audience, acted as motivators for learning. One participant indicated how when different learning styles were considered in lessons, it was easier to become engaged:

> "In our <subject> class, <teacher> will bring out the skeleton if we're learning about the bones ... and, like, make it more interacting and more interesting for people that don't really like <subject>; at least they can see it and remember it in different ways." (P5)

As is evident in the example above, the participants were able to express their appreciation for teaching practices that engaged learners with concrete and authentic learning experiences, sparking an interest in content that may otherwise not inspire intrigue. One such authentic learning encounter touted as imperative for learning motivation was the opportunity afforded by teachers for learners to work within groups, as indicated by P6:

> "Working in groups; discussing it with other people, not just the teacher, but, like, other peers who are at the same level as you ... then we can go on and pool ideas." (P6)

Teachers were, however, also touted as demotivators to learning. Those teachers who relied too heavily on repetition strategies for reinforcement, who were stagnant

in their teaching approaches, and who failed to place learning into authentic contexts were criticised as preventing learners from actively engaging in their own learning. Similar findings were reported in an Italian study on the motivation of adolescents, conducted by Littlejohn (2008). In this study delineated in Section 2.5.2, the participants reported that when teachers did not attempt to engage learners with innovative teaching strategies and authentic contextualisation of the material within the learners' world, the lessons blended into a blur of meaningless content, which required conformity to authority in order to progress to the next level (Littlejohn, 2008). The following responses from the research study highlight similar conceptualisations:

> "The one teacher ... he's decided that he's been teaching for so many years and it's worked so he's gonna stick with it..." (P3)

> "doing the same thing over and over again." (P3)

> "background knowledge and information; just giving us the bare facts to learn, ya' know? That, um, just doesn't make you motivated to learn." (P3)

The teachers who did not inspire confidence of their subject knowledge in their learners, especially in terms of utilising technology in the classroom to display such know-how in a useful manner and to an adequate level (in the eyes of the learner participants), were considered to discourage the participants' motivation to learn. However, those teachers who were considered by the learner participants as utilising technology to replace their own function, rather than accompany and support their teaching, were also viewed unfavourably as demotivators to learning. These sentiments are expressed below:

> "I've found that half the time they give us a PowerPoint[10] and we have to go learn it. Like, we'd never get taught it." (P1)

> "I think it's also important if they're gonna use a PowerPoint, then they should give us a copy of the PowerPoint because there is no point doing the

[10] PowerPoint is presentation software developed by Microsoft that enables the creation and display of a slideshow that can display text, images and videos.

> PowerPoint and then we don't have the notes ... it's distracting to listen ... and look at the PowerPoint." (P8)

Once the intrigue is lost, the motivation to continue becomes, according to the participants, difficult to reignite. "It's also quite boring sometimes, watching the same thing over and over again," P5 remarked. Such disengagement is echoed in Schmakel's study (2008) of American seventh and eighth graders discussed in Section 2.3.2. The study revealed that learners' attention begins to waiver as they disengage with the learning process, causing their performance to suffer. With this in mind, the following section presents the participants' conceptualisations of the importance that learners' motivation held for teachers.

4.3.1.3 Learners' understanding of teachers' opinions on the importance of the motivation to learn

The participants in this study demonstrated their recognition of the importance of motivation to direct learning as ascribed by their teachers. As indicated in the previous section, the participants were able to identify teachers' efforts to engage them in their classes. This is illustrated succinctly by P1, when the group was asked which factors make them want to learn in class:

> "Teachers that make an effort, that show you they want you to learn." (P1)

It would appear that the participants were aware of their teachers' individual efforts to encourage their learners to learn. As such, they acknowledged that their teachers utilised various strategies, for example, "interactive learning" (P6), using concrete, authentic examples ("In our <subject> lessons, <teacher> will bring out the skeleton if we're learning about the bones" [P5]), and randomly calling on learners to answer questions in class so as to ensure the learners are concentrating ("She'll pick on you while she's teaching and it makes you pay attention" [P8]). On these accounts, the participants recognised that learner attention and motivation was central to learners' education, according to their teachers.

4.3.2 Teachers' conceptualisations of motivation

The teachers at the school offered their expertise as witnesses to the learners' interaction and engagement with learning in the classroom. As such, their interpretations of the learners' experiences of the motivating effect of technology in education provided invaluable enrichment to the study, which in turn enhanced the credibility of the research. The wide spectrum of subject areas with which the teachers were involved at the school afforded a broad range of perspectives and insight into how motivation can influence engagement with a variety of subject content and delivery, and vice versa. The teachers' average teaching experience of above five years, with two of the teachers practising their teaching philosophies for more than 20 years, offered insight into how the generation dimensions (as discussed in Section 2.4.2.1) may influence both their interpretations of the value of technology in education, as well as how the learners may interpret the instructional methods to which they are exposed.

4.3.2.1 Definitions and descriptions of motivation

Teachers' definitions of the motivation to learn provided interesting insight into their conceptualisations of the process of education. It was indicated that in the learning process, it is not only the concrete skills that are generated in the journey of learning, but also the mental processes that are developed and continuously evolve, a conceptualisation which is congruent to literature on adolescent development as presented in Section 2.5. The teachers indicated that learning involves both an effort to reformulate understanding so as to accommodate new conceptualisations, as well as to process and modify new information in order for it to fit with preceding understanding. Such considerations represent the concepts assimilation and accommodation respectively, as described in Section 2.4.1.2. The following teachers' responses highlight these concepts:

> "So learning is about old knowledge and using that knowledge to develop [one's] own ideas." (TQ6)

> "The growth and development of the self as a result of exposure to new information or experience, or information and experience internalised in a new way." (TQ1)

Whilst most teachers cited motivation as intrinsically energised, especially as the "drive" (TQ1), "will" (TQ2) or "desire" (TQ4) to engage in a task, only one teacher described motivation as a pursuit that encompasses an effortless approach to a task.

> "Motivation means wanting to spend time learning when you could be doing other stuff." (TQ3)

One teacher expressed motivation as an extrinsic endeavour, and posed the response as if to indicate upon whom the responsibility of motivating learners befalls.

> "[Motivation is] to encourage a student to love and respect the acquisition of knowledge." (TQ5)

Almost all of the teachers who completed the questionnaire indicated that they utilise a more teacher-directed rather than a learner-centred teaching style. The majority cited the need for "boundaries" (TQ1), "direction" (TQ3), "leadership" (TQ1) and "structure" (TQ2) in order to direct the learning of their charges. The general need for extrinsic factors utilised as a means to foster the learners' own intrinsic motivation was evident, as displayed in the following quotation:

> "Students need direction. Teacher-directed learning is important. They don't always know what they don't know. They then need to be empowered to learn themselves." (TQ3)

4.3.2.2 The importance of the motivation to learn

The teachers indicated in the teacher questionnaire that in order for learners to be motivated and thus grasp the crux of their learning, it was imperative to appeal to the learners' contexts, and consider their developmental stage of adolescence. If this required the use of technology in order to grasp their attention, the teachers expressed the need to provide this authentic link in the best interests of the learners. This was succinctly expressed by the following response:

> "Technology is an integral part of teenagers' lives. The less we use technology in teaching, the more far-removed from their reality our subject becomes. Teaching with technology makes learning 'real' and relevant to their lifestyles." (TQ2)

Contemporary adolescents' affiliation for technology was explored in Section 2.4.2, and the researcher was intrigued to discover if such an affinity was evident in the research study.

4.3.3 Learners' conceptualisations of technology

In order to gauge learners' prior experience and exposure to technology, the learner questionnaire was collected before the focus group was conducted. As indicated in Section 4.2, and for which such consideration is also important for the scrutiny of results offered in Section 4.3.1, this questionnaire enabled the researcher to a) determine the level of experience of and exposure to various forms of technology, b) gauge the participants' familiarity of various technology formats and the accompanying jargon which had the potential to emerge in the focus group, and c) assess the position of authority from which learners were able to offer their opinions on the topic. Such considerations aimed to enhance the credibility of the participants' responses. As such, the questionnaire provided an invaluable backdrop to understand the learners' perspectives offered on technology in the focus group discussion.

4.3.3.1 Interpretations of technology

The articulation of the concept of technology appeared to be a challenging task for the participants of this study. They were able to name various types of technological tools to which they have been exposed in their learning, for example, "PowerPoint" (P2), "[mobile] phones or iPads" (P6), and "videos" (P8 and P2), but a holistic conceptualisation of the term technology was not forthcoming. This was anticipated by the researcher after consideration of the plethora of tools that have been described as technology in popular media, which may have influenced public opinion. As such, the learner questionnaire contained a host of contemporary forms of technology from which the participants could indicate their frequency and perceived capability of use. Their engagement with the various forms of technology provided important indications of their interpretations of technology.

The learner questionnaire responses indicated that there appeared to be a perception amongst the participants that the various technological tools held particular primary functions. Whilst the mobile phone was largely associated with

communication and socialising with family and friends, the iPad or other tablet brands utilised by participants was largely designated the primary function of entertainment (for example, accessing social media and gaming). Laptops and desktop computers were largely associated with research and homework completion. Such associations may in turn affect the exposure to and use of the various forms of technology, indicating the experience the participants may have in engaging in various tools, both within and outside of the school context.

4.3.3.2 Exposure to and use of technology

All of the participants indicated having internet access at home, with the majority sharing wireless internet (wifi) with their families. Similarly, the participants all indicated that they owned their own mobile phone (one participant indicated sharing a mobile phone with the family), with roughly half of the participants spending over five hours per week utilising their mobile phones, making it the most popular form of technology used in this study. Portable music devices were used by half of the participants for over five hours per week, whilst laptops were owned by almost all of the participants and shared with their families by two participants. Other indicated purposes for which technology was most frequently used were visiting social networking sites and watching television, movies, series, DVDs, and video clips.

Interestingly, those who did not own their own laptops either shared one with their families or owned a tablet or (least frequently) a desktop computer. This is consistent with recent American research[11] regarding adolescent technology usage (Madden et al., 2013) as discussed in Section 2.4.2.1, which suggests that 93% of adolescents either own a computer or have access to one. According to this study, half of the adolescents surveyed share a computer with the family (Madden et al., 2013). Whilst one in four American teens were represented as owning their own tablet computer (which according to Madden et al. [2013] provides strong indication of parental education and income level), more than half of the current research participants indicated that they owned their own tablets. Such exposure contrasts with South African participation in technology, as indicated by a Research ICT Africa study discussed in Section 2.5.5, which indicated that 22.8% of South African participants

[11] In this study, over 800 American adolescents (between the ages of 12 and 17) were surveyed regarding their ownership and use of various technology tools, as well as the internet connectivity afforded to them.

had used a computer at some stage at school or university (Gillwald et al., 2012). As such, it would appear that the participants of the current research are fortunate to have largely unfettered access to computer technology.

The use of the various technology tools appeared to vary according to gender. When consulting the learner questionnaire, participants' answers indicated that male participants engage more frequently in playing online and offline games, programming/creating web pages and watching TV, movies, series, DVDs, and video clips in leisure time, whilst female participants spend more time participating in social media and photo storing, and sharing activities. Male participants showed the least indication of being intimidated by technology and indicated higher perceptions of their capability to utilise technology in all spheres of use except blogging, in which both genders indicated a lack of experience and competence. As indicated in Section 2.4.2.1, there is evidence within literature of a divided interest in the use of technology according to gender, with which current research findings appear to agree (Moghaddam, 2010; Bray, 2013, Cotten et al, 2014; Mylläri et al., 2011; Kahveci, 2010). According to a study conducted with American middle and high school learners, girls utilise technology to engage with their friends and family as well as to complete schoolwork, whilst boys look to technology for entertainment and gaming (Daniel, 2005, as cited in Moghaddam, 2010). Similarly, in a Turkish study,[12] survey results indicated that female learners felt less competent to use technology than their male counterparts (Kahveci, 2010).

It would appear that technology plays a large role in the lives of the participants, if one considers the exposure to the various forms of technology, as well as the frequency with which the participants engage with such tools. When asked about their thoughts on the term Net Generation in the focus group (a term discussed in Section 2.4.2.1), the participants appeared not to have considered the unique implications of technological advancement as an influential factor in their worlds. They indicated that technology usage had become a way of life for them, and it had become second nature to structure a routine around the usage thereof.

[12] This study investigated learner attitudes towards learning technology, and was conducted with 158 learners between 9th and 12th grade.

> "It's almost like a part of your daily routine ... Like, 'check Twitter, check Facebook.'" (P6)

P3 went so far as to indicate that he had become chronically dependent on the internet:

> "I just moved into a new house, and I hadn't had internet for like two days and it was like hell ... you kind of can't live without it anymore." (P3)

Almost all of the participants indicated in the learner questionnaire that they enjoyed using technology in their leisure time, which echoes the findings of a Scandinavian study of adolescents[13] discussed in Section 2.4.2.2 (Mylläri et al., 2011). However, when asked about their enjoyment of utilising technology within the classroom, the participants' expression of their enjoyment was not as unanimous. These sentiments pointed to an interesting discovery; although the participants expressed their gratitude towards technology in their personal lives, they were able to distance their feelings towards technology to acknowledge that the tools posed certain implications for their learning. As such, an investigation into the conceptualisations of technology within the classroom is warranted.

4.3.3.3 The role of technology in education

Half of the participants indicated in the learner questionnaire that they engaged with technology at school most frequently when accessing the computer network, where many of their resources, assignments, and learning activities are housed. There were mixed reports of utilising the internet at school for research; half of the participants indicated access on a daily basis, and the other half on a weekly basis. There appeared to be consensus that technology was never or hardly ever used to engage in a class blog, to engage in learning activities online, or partake in social media for learning purposes. Only those who took computer science as a subject engaged in programming at all. Other reported uses were very scattered and ranged from using technology to collaborate with classmates regarding schoolwork and taking notes in class; while most participants hardly ever used technology to take notes in class, a few participants indicated that they utilised technology for this

[13] In the study conducted by Mylläri et al. (2011), 48 learners between the ages of 11 and 18 were interviewed.

purpose on a daily or weekly basis. Thus, it would appear that technology use was largely a personal choice for the participants. This understanding was expressed in the participants' responses in the focus group; some of the participants expressed an affiliation for the use of technology to aid their learning, whilst others indicated that technology usage did not serve them, as expressed in the following two responses:

> "I was using my dad's iPad because I wanted to see how it worked and I only used it for a week at school and then it didn't work for me." (P8)

> "I don't believe that learning off an iPad/laptop (devices) is better than having physical notes. However, that is only my personal opinion. Each learner is different." (LQ10)

> "It might depend on what kind of a person you are. Like, I personally find that when I work on electronics that I work better." (P7)

> "I think it greatly improves my ability. Finding out new techniques and creating summarised notes, depending on your learning style." (LQ16)

As eluded to in Section 4.3.3.2, the participants were able to distance themselves from their personal enjoyment derived from using technology to evaluate the merits of technological tools in the classroom. As such an investigation into the participants' conceptualisations of the benefits and challenges as afforded by technological tools in education was made possible.

Many of the participants indicated that the use of technology decreases the time and effort required of them to complete schoolwork, provides access to different perspectives and information, as well as ensures convenience in the sense that necessary information is easily available and accessible. Such conceptualisations allude to the considerations of the digital native, as evaluated in Section 2.4.2.1, as well as the implications posed for contemporary adolescent learners, as described in Section 2.4.2.2. Comparable sentiments were discovered in a Taiwanese study[14] delineated in Section 2.5.4, whereby learners approved of the ease of access and

[14] The research study was conducted with 44 English second language learners in Taiwan. Video blogs were employed to enhance the learning experiences of the Taiwanese learners as they practiced their English public speaking skills.

revision afforded to them via a blogging exercise (Shih, 2010). The opinions of the current research study's participants elucidate such claims:

> "If you don't understand something it's easier to just look it up on the internet than, like, make an effort to go find out more." (P5)

> "It's just easier, I suppose. I find it quite tedious writing so much ... especially when you have projects that you need to have help with referencing ... it takes a very long time to write out those references if you're writing them out, whereas you can just type them." (P7)

> "Knowing how to use various programmes and applications on my laptop makes doing projects a lot less tedious as the information is at your fingertips." (LQ9)

Some of the participants indicated that technology provided access to authentic learning scenarios, which enabled consolidation of learning.

> "We do a lot of, like, watching videos and like you can look up interviews and stuff with people who were there at the time...So you can see the primary aspects of it as well." (P5)

> "YouTube[15] videos ... confirm that we know everything." (P2)

> "If there is any section of work I cannot understand, there is a wealth of tutorial videos and exercises online to aid me in my learning of the topic." (LQ18)

Such access provided them with admittance to a wide range of perspectives and resources, wider than the classroom scenario could provide, as indicated by one learner questionnaire respondent:

> "[Technology] allows for my learning to expand because through technology I am evolving everyday and learning new things from and about different places, people and subjects all over the world." (LQ4)

[15] YouTube is a video-hosting site where viewers can watch video clips and upload their own.

Such sentiments were validated by the participants' responses in the learner questionnaire, as the majority indicated that they would prefer that they had access to video clips, search engines, and learning apps within the classroom, and were supported by their teachers in their after-hours learning with access to online exam archives and practise quizzes. They also indicated appreciation for the feedback of their learning efforts afforded to them by technology, the possibility of a variety of presentation formats, the ability to communicate with teachers and classmates, as well as the organisation and time management of schoolwork that technology provided. Such findings correspond with those of Kahveci's study conducted with adolescents in Turkey (2010), where findings suggested that learners perceived technology as enhancing their learning, and expected that their subjects used technology in order to augment their learning. As such, in the present study, there was an expectation that technology provided an assistive role in supporting education, as voiced in the learner questionnaire:

> "[Technology is] very important – [I] cannot do without it. Technology is necessary to research information for projects, access past papers and additional resources not given in class." (LQ8)

One of the most pressing challenges that learners reported with regards to technology in education was the potential for distraction. More than half of the learner questionnaire participants indicated that technology distracts them from the scholastic task at hand. One respondent indicated that "distracting sites that impair learning" formed part of daily technology use at school (LQ6). The participants acknowledged that such distraction affected their ability to learn and detracted from their self-regulation and intrinsic motivation.

> "We become quite distracted in classrooms when we have access to these technologies ... when we are supposed to be learning. Our teacher does use interactive websites, yet the kids are sitting in the back with their phones and not interacting." (P4)

> "You can play games or you can go onto the internet and do things [other] than working so ... especially if it's something that you're not really interested in or it's quite boring, you can just do something else." (P6)

The distraction was so large for two participants that they indicated that technology should be utilised out of the classroom, either for "extra enrichment after school hours" (LQ12) or for "social purposes" (LQ14), which again highlights the particular function that learners ascribe to various technology tools.

A further challenge noted by participants with regards to utilising technology in the classroom was teachers' lack of competence to use technology effectively in the classroom. When a teacher uses technology competently, according to the participants, it can be regarded as useful:

> "In <subject> ... <teacher> has already got the memo set out so he can just put it up, and it saves us time. It's quite convenient." (P4)

It would appear as if this teacher is appealing to his learners' sense of appreciation for decreased effort and convenience, and thus they acknowledge the worth of technology in this instance. However, with regards to the teachers who they perceived not to have an adequate grasp on technology, their appreciation of its use in the class decreased.

> "He can't use technology; I'll just put it like that." (P1)

> "If they're gonna use a PowerPoint then they should give us a copy ... because there is no point doing the PowerPoint and then we don't have the notes 'cause then it's distracting." (P8)

Furthermore, more than half of the learner questionnaire respondents indicated that teachers need to be good at using technology in order to use it in the classroom. The participants also implied that teachers need to understand the time and place for using technology, succinctly indicated by one participant's response below:

> "When teachers do not understand the technology, it takes away from my learning." (LQ5)

Similar sentiments were discovered in Lei and Zhao's study[16] (2007), described in Section 2.5.2, which reported that it is the quality of technology and not the quantity

[16] 130 seventh and eighth grade learners and 10 teachers from an American middle school completed surveys and/or were interviewed with regards to their opinions on technology in the classroom.

that is appreciated by learners. It would appear as if technology for learning is accepted by the participants in certain circumstances and under certain conditions. The participants mentioned their school's plans to implement a technology 'roll-out' in the next few years. They indicated that they would prefer a choice of when to personally use technology for learning, insisting that technology be used as an assistive teaching and learning aid; a complementary tool, taking learning styles and preferences into account. This is perfectly encapsulated in the following responses:

> "Having technology as a side ... getting additional information without completely overtaking the whole learning experience." (P2)

> "You should be able to choose what you wanna do. So some people would prefer pen and paper and others will prefer to use technology so I think there should be, like, more options too that it can suit everybody." (P6)

Although not anticipated by the researcher, such findings of technological dissidence have been reported in the higher grades in international studies. In Kahveci's study (2010), learners from the lower grades expressed more positive attitudes towards technology utilised in education than the higher grades. In Lei and Zhao's study (2007), it was concluded that while technology aided learners to reach their learning goals, too much time spent utilising technology was deemed detrimental to learning. The participants noted the possibility for technology to be a distraction; it was the teachers who indicated that learners often opened up other activities on their computers to what the teacher was discussing (Lei & Zhao, 2007). Perhaps the participants' teachers in the current study would be able to shed light on their learners' experiences with technology, and how such experiences are manifested in the classroom.

4.3.4 Teachers' conceptualisations of technology

As indicated in Section 4.3.2, the teachers' understanding of their learners' interaction with technology offered important insight into the participants' experiences and conceptualisations of technology. It was anticipated by the researcher that the teacher respondents may embrace the potential that technology could hold for motivating learners to engage with the subject material, as discussed

in Section 2.4.2.1; however, the teacher respondents' insights transcended such expectancies. Such insights will be recounted in the following sections.

4.3.4.1 Interpretations of technology

The teachers who responded to the questionnaire were forthcoming in acknowledging the learner as a member of a technologically-rich generation. They expressed the need to adapt their teaching practices to cater for the experiences and interests of the modern adolescent, a practice which was discussed in Section 2.3.4, where it was described how Schmakel (2008) similarly noticed such appreciation for teachers' efforts by the learner participants in her study[17]. Such consideration for technology's potential to enhance teaching practices was reflected in a South African study with high school teachers from Kwa-Zulu Natal, as discussed in Section 2.5.5 (Govender, 2013). As such, the teachers in the current study indicated that technology held the power to catch and hold their learners' attention.

The teacher respondents also acknowledged the potential for technology to accommodate learners' individual learning styles (a point which the focus group participants themselves also acknowledged and appreciated of technology). A further mutual awareness shared with the learner participants was the potential for distractibility, as indicated by one of the teacher's responses below:

> "I think it allows teachers to be more imaginative and creative in their delivery, but I find the classes are distracted easily by the iPads on their desks. They often switch between the given task and social media." (TQ6)

Such sentiments were shared by Lei and Zhao (2007), who noted that the teachers in their study reported that their learners frequently opened up additional activities whilst the teacher discussed different content. Similarly, in the current study, one teacher indicated taking his cue from the class regarding their preferences:

> "My <subject> class told me they prefer it when I work on the board in my own handwriting. Otherwise the technology just distracts them." (TQ6)

[17] Schmakel's study was conducted with 67 seventh grade learners from four urban American schools (2008).

In consideration of the above sentiments, one wonders about the effect such conceptualisations would have on teachers' willingness to engage with technology within the classroom.

4.3.4.2 Exposure to and use of technology

Almost all of the teachers indicated in the teacher questionnaire that they perceived their technological capability was at an advanced, if not expert level. They indicated that although they received regular training to utilise technology in their lessons from the school, most of their technological knowledge was "self-taught, or picked up from others informally" (TQ1). There appeared to be consensus that technology had changed the way that the teachers approached their learning.

The teachers expressed their concern regarding the potential challenges that could arise should technology take a more central role in their school. They feared that their colleagues may resist using technology within their classes, and that the school infrastructure (especially the network and bandwidth) may labour under increased technological demand, which resonates with Govender's research (2013), wherein teachers noted the importance of addressing "structural, pedagogical and curriculum" innovation in order for technology to effectively enhance learning (p.563).

4.3.4.3 The role of technology in education

Whilst the teachers who responded to the teacher questionnaire indicated that certain technological tools were available or permissible for use in their classrooms, many of these were not used frequently. It would appear that the use of such technologies depend on teachers' personal preferences and their perception of their subject's requirement of such tools. In general, computers reserved only for teacher use were indicated as utilised almost daily, as were projectors, Microsoft Office[18], email facility, and the school's network. Search engines, YouTube, learner tablets, learner mobile phones, and personal music players were admitted less frequently for use in the classroom, whilst SMARTBoards[19], DVDs, television, filming devices,

[18] Microsoft Office is a software package suite, and consists of applications and programmes such as Microsoft Word, Microsoft Excel and Microsoft PowerPoint.

[19] SMARTBoards, developed by Smart Technologies, are interactive whiteboards that can be operated by touching the whiteboard interface to control applications that are projected onto the surface platform.

tutorial programmes, social networks, and blogs were hardly ever or never used in the classroom. It is important to consider that some of these tools may be outdated, and may have been replaced by other technology formats (for example, DVDs and television could be replaced by the use of YouTube).

All of the teacher respondents indicated that access to technology was imperative for optimal learning. They reported that technology afforded learners exposure to a plethora of resources that could help consolidate learning, provide important engagement with their subjects, and appeal to the learners – one teacher participant used the term 'digital natives' to refer to his learners (TQ3). Another respondent indicated that the role of technology has changed, and as such the teacher's role must change accordingly.

> "The focus of teaching is more about how to find information rather than memorizing it, technology helps in sourcing information." (TQ1)

As such, learners are provided with the tools to enable themselves to become more autonomous learners, as indicated unanimously by all of the teachers in the teacher questionnaire, and echoed in the findings of Corbett and Wilson (1998) in a longitudinal study with over 200 American middle school learners (discussed in Section 2.3.4). When afforded the opportunity to work independently, the American learners engaged with their peers in enjoyable pursuits to complete projects that challenged them. Such considerations correspond with the conceptualisation of contemporary learners as autonomous, active knowledge constructors, as discussed in Section 2.4.2.2.

4.4 SUMMARY OF RESEARCH FINDINGS

Initial perceptions of motivation were expressed by the participants to be intrinsic in nature, whereby curiosity was piqued and a self-assigned goal identified, for which the effort required to reach such a goal was considered worthwhile. In such intrinsic stages of engagement, learning opportunities are presented, according to the teachers, to develop skills and mental processes required to learn, which involves both accommodation and assimilation of information. Whilst the majority of teachers cited motivation as largely an intrinsic endeavour, only one indicated how such intrinsic motivation was to be nurtured. Educator-directed teaching approaches were

hailed by the teachers as imperative to provide the structure necessary for learners to engage with their learning. The participants, on the other hand, were able to voice their recognition of their potential to actualise intrinsic motivation, and expressed cognisance of various extrinsic factors that affected their ability to initiate such motivation. In contrast, the absence of motivation was reported to result in procrastination, task-avoidance behaviour, and rushed completion of tasks, which was acknowledged by the participants as unfavourable for optimal learning.

Teachers who presented content in a manner that considered their learners' mixture of learning styles, and who made an effort to ignite their learners' interest in the subject content were hailed by the participants as motivating factors for engaged learning. Technology that accommodated a variety of learning styles was praised by learners and teachers alike. The participants also expressed appreciation for teachers' efforts to provide concrete examples within authentic learning experiences, such as the opportunity for group work, and to engage in material that was regarded as relevant to contemporary learners' lives. Such practices were appraised by teachers as essential in order for them to connect to their learners' contemporary contexts and educational needs. One such attempt that was not recognised as largely successful in motivating learning was the promise of grades in return for effort.

Teachers were, however, also touted as demotivators to learning. Those who relied too heavily on repetition strategies for reinforcement, who were resistant to contemporary teaching practices, and who failed to authentically contextualise their subjects were criticised as preventing the participants from actively engaging in their own learning. In addition, the participants lamented those teachers who could not inspire confidence in their learners of their consideration of when and how to utilise technology in the classroom effectively.

The participants appeared to battle to arrive at a holistic conceptualisation of all that constitutes technology. Many of the popular technological tools were designated various functions, which differed depending on the settings in which they were mainly utilised, and private access to a host of such tools was afforded to a large extent to most if not all of the participants. Both the frequency of use and the perceived capability of utilising technology showed gender division in terms of the

type of technology used and for what purpose, as well as the level of ease with which certain technological functions are performed. For most learners, however, the use of technology had become a way of life in their personal lives, and they reported their dependency on the various tools for communication, socialisation and entertainment; all of which the teachers could appreciate, and endeavoured to accommodate such considerations in their classrooms. Nevertheless, in a learning capacity, beyond using technology for research (which the majority of the participants agreed is an imperative function of technology), the participants indicated that the individual use of technology depended on personal preference. Similarly, whilst various technological tools are at their disposal in the classroom, it is teachers' personal preferences, perceived capability and perception of their subjects' requirements that largely dictate the use thereof in teaching and learning. If technology was to be utilised by teachers in the classroom for teaching purposes, the participants indicated that it should be used as a complimentary tool so as to consolidate learning, and not to replace the teacher.

The value of utilising technology in the classroom was assessed by both the participants and their teachers. According to the participants, technology offered convenient access to a plethora of information, perspectives, and authentic learning opportunities (a point with which the teachers concur), feedback on assessments, a variety of presentation formats, effective communication channels between teachers and classmates, as well as organisation and time management. Learners were, however, able to overlook their personal penchant for technology to admit that technology largely distracts them from their learning efforts, and as such, if attempts are not acknowledged to address such distraction, technology has the potential to impede rather than aid self-regulation and autonomous learning. Such sentiments were echoed by the teachers. Further challenges stipulated by the participants were teachers' lack of technological competence and discernment of the time and place for effective use of technological tools. The teachers who responded to the call to join the research, however, felt confident of their ability to utilise technology effectively. They indicated that teachers' roles had to adapt to new demands placed on them by a new age of technology; to enable learners with the tools to access their own learning and become autonomous. Nonetheless, they did voice their concerns

that stagnant colleagues and school infrastructure may buckle under the pressure of further technological development.

In the following and final chapter, the research findings will be discussed in the light of the research questions and as informed by the social constructivist framework.

4.5 CONCLUSION

Whilst the chapter provided a précis of participant particulars as well as the data collection and analysis course of action taken in this research study, the main function of Chapter 4 was to present and discuss the findings of the research study in light of other studies (both national and international) concerning motivation and technology with regards to education.

Chapter 5 provides the backdrop against which the final conclusions of the research can be drawn. The limitations of the study are reviewed, upon which recommendations for improvement and further research are delineated. Personal reflections of the researcher conclude the chapter.

CHAPTER 5

CONCLUDING REMARKS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The objective of this chapter is to delineate how the findings of this study are able to address the research questions. As indicated in Sections 1.5 and 2.2, the social constructivist framework provided the backdrop to the study, within which the findings are situated and reviewed as such in this chapter. The strengths and weaknesses of the study will then be critiqued, and recommendations for succeeding research will be discussed. The chapter will conclude with the researcher's reflections of the research journey.

5.2 CONCLUSION AND DISCUSSION OF RESEARCH FINDINGS

5.2.1 Research questions

As discussed in Sections 1.4 and 3.3, this exploratory study aimed to answer the following primary research question:

> What are learner perceptions of the motivating role of learning technology in education?

The following secondary research questions aimed to direct the focus of the study and develop a richer, more comprehensive understanding of learners' considerations of learning technology:

1. What are learners' conceptualisations of the role of motivation for optimal learning?

2. What are learners' conceptualisations and experiences of the role of technology, especially when used within the classroom?

3. What influence do learners' perceive technology to have on their motivation to learn?

4. What are teachers' conceptualisations and experiences with regard to the role of technology in motivating learning?

5. How do teachers' perceptions and experience of technology influence learners' conceptualisation of technology in education?

The following section enables a critical engagement with the research findings in order to address such questions. It is through the social constructivist framework, which has provided the theoretical underpinning as woven throughout the research study, that such a comprehensive evaluation is afforded.

5.2.2 Consideration for the interpretation of the research findings

As a result of the psychosocial developmental phase (particularly the egocentric self-conceptualisation) through which the learner participants are navigating as discussed in Section 2.4.1.3, it is important to consider the possibility that the participants may have acted or responded unnaturally whilst attempting to portray a particular impression of themselves in the presence of their peers. Similarly, the teachers may have responded with socially desirable responses in the questionnaire, for fear that their responses would indicate an expression of their technological understanding and performance within the classroom, or lack thereof. Despite the researchers' attempts to stress the importance of authentic interaction within the focus group, as well as attempts to ensure the anonymity of participation in both the focus group and questionnaire completion, readers are respectfully requested to keep such considerations in mind when engaging with the research findings.

5.2.3 Discussion of research findings

It was discovered that complex relationships exist between the research categories and findings as presented in Section 4.3, and as such, some of the findings are presented under specific headings whilst they may address multiple research

questions. With this in mind, an appeal is made for the reader to take this into account when engaging with the findings. Furthermore, a schematic representation of the results is presented in Figure 5.1 in order to facilitate conceptualisation of the research findings as well as how such discoveries inform a holistic understanding of the motivating effect of technology in education, as underpinned by a social constructivist framework. The reader's attention is directed to this figure several times in this discussion, as it provides contextualisation for the connection between the various elements of this study.

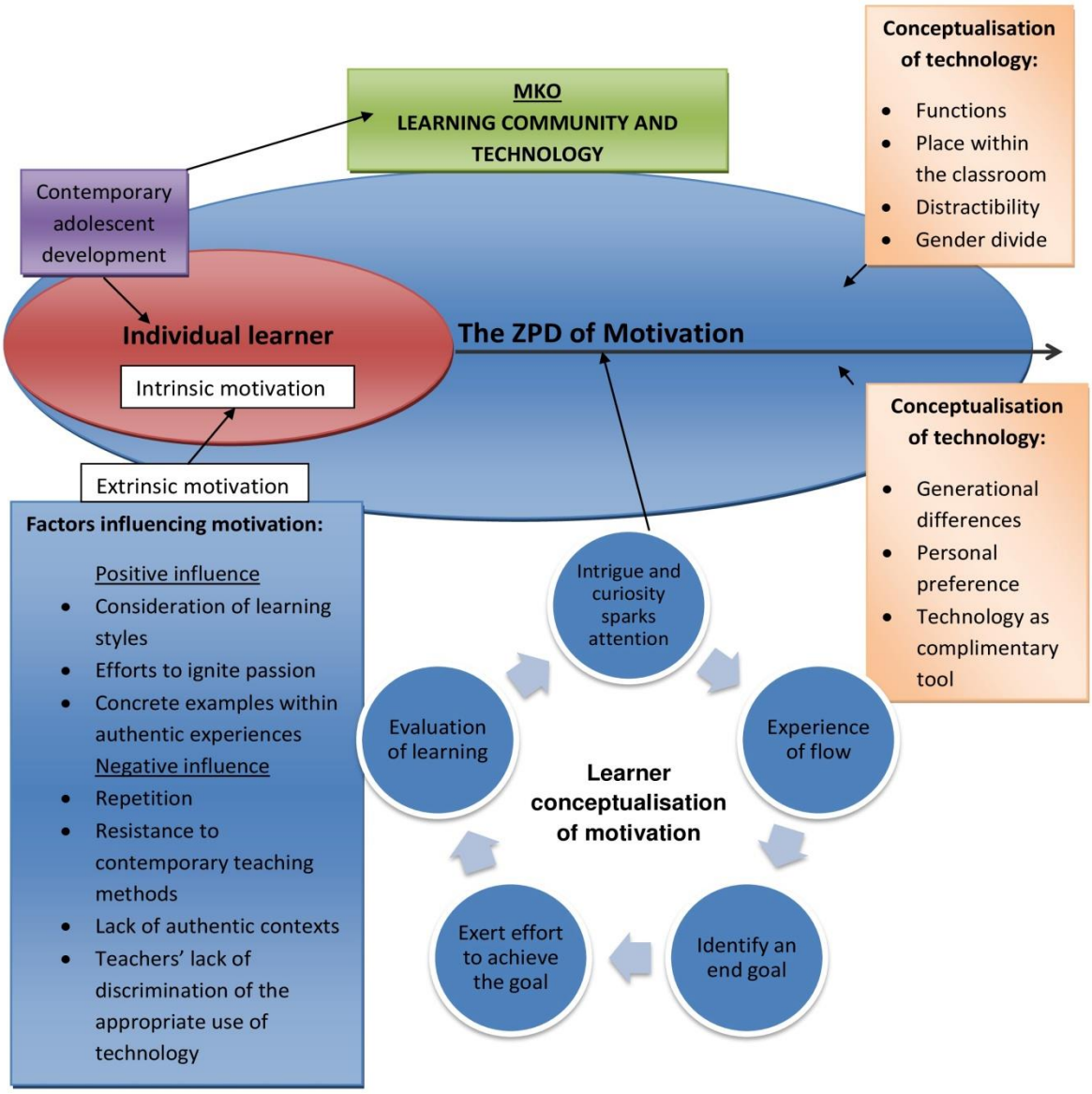

Figure 5.1: Adolescents' conceptualisations of the motivating effect of technology in education, as underpinned by the social constructivist framework (Adapted from Vygotsky's social constructivist theory of learning)

5.2.3.1 Overall perceptions of motivation

According to Crosby Bergin and Bergin (2014), external motivation refers to those factors external to the individual to pursue a task, whilst intrinsic motivation refers to the desire inherent within an individual to succeed. As discussed in Section 4.3.1,

the learner participants' understanding of the concept of motivation emanated as a social constructivist group effort within the focus group. The participants offered their understanding of what constitutes motivation as ultimately an intrinsic effort with a focus on improving one's own performance - a practice which appears to require a degree of maturity and introspection, and thus speaks to adolescent aspirations of independence (as indicated in Section 2.4.1.3). They cited examples of their experience of motivation within the classroom, as well as their insight into the factors that contribute to such intrinsic motivation development. Such a conceptualisation provided the backdrop against which the focus group could coherently discuss their experiences of the influences on their learning, such as the use of technology for learning. The teachers' perceptions of learning and motivation, as well as their understanding of learners' interaction with such attempts to stimulate motivation, provided further impetus for a holistic illustration of motivation as experienced within the collective learning community.

Whilst the teacher participants envisaged motivation as largely an intrinsic endeavour, whereby adolescents' developing cognitive skills and mental processes enable the assimilation and accommodation of information as presented in a teacher-directed fashion (as reported in Section 4.3.2.1), the learner participants collaboratively offered important insight into their own learning, detailing the manner in which intrinsic motivation is fostered and maintained. A combination of motivation conceptualisations and considerations are employed in the explanation of these findings as presented in Section 4.3.1, which are schematically represented in Figure 5.1 in relation to the use of technology to support learning. Firstly, in order for attention to be piqued, self-determination theory, as delineated by Deci and Ryan (2000) and described in Section 2.3.2, maintains that perceived competence in ability, perceived control over the requirements for success, and relatedness to authentic learning environments are necessary. As such, the learner participants' in this study required that their teachers use authentic, concrete examples in their teaching, which provide the situation interest required to evoke personal interest as indicated by Schraw et al. (2001) in Section 2.3.4. Such experiences provide opportunities for engagement and appeal to the personal and social contexts of contemporary adolescents (see Section 2.4.2.2). In order for learners' attention to be maintained, flow theory (as showcased in Section 2.3.2) provides explanation for the

persistence with which learners continue to engage in learning, which in turn prompts goal-directed behaviour, further experiences of perceived control, and enjoyment – all requirements for the sustained effort required to reach such goals (Rathunde & Csikzentmihalyi, 1993; Shernoff & Csikzentmihalyi, 2009). The learner participants' prolonged engagement with and dependency on technology in their personal pursuit of adolescent social connectivity (as indicated in Section 4.3.3.2) provides such evidence of flow, as does the ability that technology is reported in this study (by both teachers and learners) to distract learners from their school work. One wonders if the social construct 'distraction' is viewed in a negative light as that which steals away focus from a task at hand, and could be reconceptualised as that which has the potential to catch and hold attention in a personally meaningful and authentic manner. Such consideration speaks to the practice of gamification, which, according to Muntean (2011), utilises the engaging properties of games to enhance learning autonomy, as discussed in Section 2.4.2.2.

As conceptualised in Section 2.3.2, motivation, when inspected through a social constructivist lens, refers to both intrinsic and extrinsic motivation, whereby personal engagement in learning is stimulated as a social motivation; influenced by external factors within the learning community in the pursuit of collaborative knowledge construction. Such external factors provide important considerations for the delivery and management of contemporary education.

5.2.3.2 Factors affecting motivation

Whilst the teacher participants emphasised the importance of structure necessary for learner engagement in learning, the learner participants acknowledged their own potential to actualise intrinsic motivation, and could pinpoint those factors which influence the opportunity for such actualisation of extrinsic to intrinsic motivation.

As presented in Section 4.3.1.2, the learner participants of this study were able to collaborate to create a group understanding of the factors which acted as motivators and demotivators for their learning. Teachers were hailed as both the former and latter. Those teachers who took the various learning styles into account, attempted to ignite the passion of their learners as well as provided concrete examples within authentic, meaningful contexts were hailed as motivating factors to learning. The

teachers also recounted the importance of contextualisation of learning so as to appeal to learners' contexts and developmental level. The learner participants indicated that technology enabled them to relate to the teaching content, provided it is utilised as a complimentary aid and not a teacher replacement, which echoes the sentiments of Selwyn (2010) as discussed in Section 2.5. As such, it could be acknowledged that teaching which supports learning (through the use of authentic examples and contextually relevant technology use), helps to match learners with interesting and relevant content (Brophy, 1999), and as such, is able to provide favourable conditions for effective knowledge production. Henceforth, when recruited appropriately, technology can support the metamorphic shift required to transition learners beyond their ZPD, according to the social constructivist theory.

Conversely, the demotivating factors which prevented such knowledge production beyond the ZPD were also reported by the learner participants as teacher-directed. As indicated in Section 4.3.1.2, the meaningless repetition of content, lack of authentic contexts with which learners could connect, as well as teachers' resistance to contemporary teaching practices took centre stage as those factors which did not inspire nor engage motivation. Whilst the teachers acknowledged the importance of maintaining relevance with regards to education for the contemporary adolescent (see Section 4.3.4.1 for a discussion thereof), the learner participants acknowledged that the teachers' ability to use technology effectively in a discerning manner largely influenced the way that they were able to engage with the content. Without motivation, the participants illustrated the potential for procrastination, task-avoidance behaviour, and rushed work, whereby the potential for engaging in a learning flow is boycotted. The lack of motivation thus robs learners of the ability to engage in the learning process, preventing assimilation and accommodation of new knowledge.

As explained by Sivan (1986) in Section 2.3.3, "motivation is a socially negotiated process" (p. 210) which integrates both personal and collaborative motives for learning. Within this study, the learner and teacher participants acknowledged the role of technology in the contribution towards contemporary learning. The reader is referred to Figure 5.1 for a schematic representation of the role of motivation within the learning equation as afforded by technology.

5.2.3.3 Overall perceptions of technology

Whilst the individual participants were challenged in their individual articulation of what constitutes technology, the description of motivation evolved as a group effort on the part of the focus group participants. When asked in the focus group about their thoughts of the term digital native, the participants appeared not to have considered the unique implications of technological advancement as a factor in their worlds, which speaks to the egocentric conceptualisation of adolescent development inherent in adolescent cognitive development (as discussed in Section 2.4.1.2).

It is important to consider that the influence of technology in the lives of adolescents poses interesting challenges for its use within the classroom. The 'looking glass self' as described by Sebastian et al. (2008, p. 441) in Section 2.4.1.3, refers to the perception of how others may come to view one. As the introduction of technology into the classroom widens the audience base, this could either a) threaten adolescent self-concept, and as a result, the willingness of adolescents to partake in technological activities at school that require exposure of such an identity, or b) provide the cloak of anonymity required for even shy learners to engage more purposefully. As such, these possibilities posed by technology require careful consideration and critical engagement so as to determine the affordances of such tools within particular contexts, such as the classroom.

In addition, the learner participants' description of the threat of distractibility that technology poses for them within educational settings is not surprising. Not only is the dependence on technology socially constructed within their peer circles, as is evident in the expressed need for management of both an offline and online identity as described by Hongladarom (2011) in Section 2.4.2.1, but the area of the brain responsible for impulsivity inhibition undergoes extensive development in adolescent neurology (Giedd, 2004). The learner participants appeared to have exposure to a wide variety of technology tools in a personal capacity; many of which they utilise on a regular basis. Furthermore, the learner participants' conceptualisations of technology appeared to indicate that various functions of technology were designated to specific technology tools at hand. As such, when these tools are integrated into the classroom, the prior social construction of the function of each tool may challenge learners' considerations of their place within the classroom. The

same applies to teachers' conceptualisations of the potential of technology to pose as a distraction. Such an example is provided in the social construction of the use of mobile phones. Watkins (2009) indicated that participation in social media communication has become a way of life for adolescents. Therefore, whilst the learner participants indicated that mobile phones are primarily used for communicating and socialising outside of the classroom as a result of the social constructed perception of the function of such tools, one wonders if learners (and teachers) are then able to reconceptualise them as tools for research in the classroom. Such conceptualisations pose interesting consequences for the classroom, and engagement with such a phenomenon between all role players is required if technology is to be used within the classroom. This would require critical engagement with the affordances that the tools offer, as well as collaboration between all role players to reconceptualise the social construction of the place of technology within education.

The socially constructed notion within literature regarding the gender divide (as reported in Section 2.2.1) was somewhat supported by the findings of this study. Whilst the male participants portrayed higher levels of perceived competency to utilise technology than female participants, the genders also expressed affinity for the use of technology for different functions. This information is important for teachers to consider when utilising technology to supplement learning within the classroom, as varying levels of scaffolding and different learning experiences or contexts may be required.

The reader is kindly directed to Figure 5.1 for a schematic representation of the participants' conceptualisations of technology and how they are socially influenced.

5.2.3.4 The role of learning technology in twenty-first century education

As discussed in Section 2.4.2.1, the various generations have different experiences of technology, which could serve to explain the learner participants' difficulty in conceptualising teachers' 'resistance' to the use of technology in the classroom. Whilst the use of technology is socially constructed as a way of life for the contemporary adolescent, aptly depicted in the moniker 'screenagers' used by Yoon, et al. (2013, p. 534) in Section 2.4.2.1 to portray the collective contemporary

adolescent body; teachers may have a different social construction of technology, as afforded by the different generations' exposure to technology. As such, it would appear as if the teacher participants' conceptualisation of technology influences the way that their learners perceive the success of such teaching as well as on their motivation to learn, which ultimately influences the ability of technology to effectively aid learning.

Whilst the use of technology in education for personal use for both the learner and teacher participants (for example, learners' note-taking on a tablet and teachers' utilisation of the available tools) appeared to be a personal preference, the majority of the learner participants acknowledged that technology afforded several valuable attributions to their education. As indicated in Section 4.3.3.3, according to the learner participants, technology offered them almost unlimited access to information and a variety of perspectives, as well as authentic learning opportunities, as echoed by the teacher participants. Appreciation for the ability of technology to provide feedback regarding assessments, a variety of presentation formats, open communication channels between teachers and peers, as well as organisation and time management were noted by the learner participants. Learner participants, however, were clear that technology should aid their learning and not replace the function of the teacher within a goal-orientated problem-solving approach to utilising technology within education, as reiterated by Selwyn (2010) in Section 2.5. The teacher participants echoed Selwyn's understanding that teachers need to make time for frequent training, and to engage with the affordances of technology tools in order to support learners' knowledge development. An attractive model for contemporary education thus comes to light: The teacher together with peers within the class make up a learning community, and when coupled with technology (as a teaching aid to supplement learning beyond what the teacher can provide), this force can be illustrated as an effective more knowledgeable other (MKO) required for knowledge development beyond the zone of proximal development (ZPD) as discussed in Section 2.2.

This model provides the framework for various efforts for collaborative learning. For example, the development of Web 2.0 offers opportunities for content creation, whereby learners are able to work collaboratively to regain ownership and control of

their learning, engage with authentic learning experiences, and achieve a sense of competence from contributing to a knowledge database afforded by the internet (Hazari et al., 2009, as delineated in Section 2.5.4). This empowerment of the adolescent offers respect for their fledgling independence, whilst providing the benefit of learning community support and modelled motivation as described in Section 2.3.3. Coupled with this, as indicated by Shernoff et al. (2000), the social interaction offered by virtual communities can further inspire motivation and scaffold understanding. Such engagement by teachers in order to facilitate learning was recognised by the teacher participants in this study, and their sentiments echo those of Reigeluth and Joseph, (2002, p. 11, described in Section 2.4.2.2) who note that teachers are required to transform from the orthodox “sage on the stage” teacher to the “guide on the side” learning facilitator, with the help of technology. As a result, learning has the potential to become more autonomous as learners are provided invaluable scaffolding, which can be personalised and even extended outside of the classroom after school hours.

Such an experience of learning, whereby learners are afforded practical, collaborative engagement and control over their own knowledge construction, speaks to the model of experiential learning as illustrated in Section 2.3.2, the premises of which underpin the social constructivist theory of learning.

In a reading of the results of this study, it is imperative to consider how learners reached their conceptualisation of the motivating effect of technology in education. It is interesting to note the insight with which the learner participants could identify their understanding of the role of intrinsic motivation to learn. According to the learner participants, such a process involved intrigue sparked by authentic, engaging experiences which result in an experience of flow, maintained by the identification of a goal and effort to achieve such a goal, as well as an evaluation of such learning. There was recognition of the extrinsic factors at play which influenced such intrinsic factors (as understood by the learner and teacher participants somewhat differently). The learner participants considered such factors as teachers’ considerations of learning styles, efforts to ignite passion, and the use of authentic learning experiences, but also teachers’ use of repetition, lack of authentic context, resistance to contemporary education underpinnings, as well as indiscriminate use of

technology. Learners' projections of the success of technology within education depended on the use of such tools as a complimentary aid to teaching, which takes into account the potential for distraction, personal preferences of learning, and especially the generational and gender conceptualisations of contemporary adolescent development. In an understanding of the role of technology as a MKO (guiding the facilitation of intrinsic motivation and thus ZPD transcendence), critical engagement with the function and affordances of technology, both in a personal and scholastic capacity, is made possible.

5.3 STRENGTHS AND LIMITATIONS OF THE STUDY

It is imperative to review a research study to identify both the strengths and limitations, so as to contextualise the findings as well as to provide direction for future research. As such, a discussion will ensue regarding the limitations, and will conclude with the particular strengths of the study.

The first limitation concerns the sampling of the research participants. As explained by Jones et al. (2014) and delineated in Section 3.4.2.1, bounded cases are restricted in scope with regards to the number of participants and observation opportunity, and as a result, limit the extent to which the results can be generalized to a wider population. In this study, the participants consisted of learners and teachers from one high school in the Western Cape that predominantly serves an affluent area of Cape Town. As such, the learner participants (who are between 16 and 17 years of age) hail from relatively privileged backgrounds. Almost all of the learner participants indicated that they had frequent interaction with technology (both in a personal and scholastic capacity). Considerations of such access to technology (as described in Section 2.4.2.2) must be examined for the potential influence on the research findings. As such, the sample of learners did not accurately represent the total population of adolescent learners at the school or the total population of learners within the Western Cape. Similarly, the school that was chosen for the study has a rich technology influence, and teachers receive regular training to enable them to utilise such technology within their classrooms. Teachers recruited for this research were identified by the principal as frequent users of technology within the classroom, and as such, may have more of a conceptualisation of the effective use of learning technology than other teachers. Therefore, it follows that the school may

not accurately represent the total number of schools within the Western Cape. However, the school did provide an investigation into a salient context wherein the opportunities afforded by a variety of technology tools, teacher training, and personal technological access offered insight into the motivating potential of technology in education.

Qualitative research is not primarily concerned with the generalisation of research findings in favour of specific contextual investigation. However, consideration must be made of the potential conceptualisations of learners and teachers from other South African populations, socio-economic groups, and school contexts that were not included in this research study, and whose absence influences the transferability of such. In order to address this concern, the researcher endeavoured to describe the research context of the study, the school setting, as well as the research participants themselves (see Section 3.5.2), providing other researchers with contextual information with which to evaluate the possibility of transferability for their own research. As such, the study has the potential to inform further research into how technology can be successfully employed in less-advantaged schools to motivate learning.

A further identified limitation of the research study is concerned with the data collection methods. Whilst the focus group offered the opportunity to access the conceptualisations of a number of participants at a time, further exploration of particular views expressed in individual interviews would have added depth to the study. When examining the literature, the researcher recognised that few research studies investigated the motivating effect of technology in South African education, especially from the learners' perspectives (as discussed in Section 1.3). As an exploratory study, various themes were identified; however, the scope of this research on the motivating effect of technology in education prevented an in-depth investigation into such themes. Researchers are invited to further such analysis by conducting individual interviews with salient members identified from the focus groups. As such, this exploratory study could provide the impetus for further research to explore and advance such understanding. Suggestions for such research will be presented in the following section.

5.4 RECOMMENDATIONS FOR FUTURE RESEARCH

The aim of this study was to investigate the motivating effect of technology on learning in education, and the findings were able to provide enlightenment into the conceptualisations of the learning motivation of 16- to 17-year-old learners and their teachers from a Western Cape high school. As indicated in the previous section, future research studies that further develop such insight into the investigated topic would provide a more comprehensive understanding of the phenomenon that is learning technology within South Africa. As such, the following recommendations for such research are suggested:

- Learner participants should be recruited from different populations, ages, socio-economic groups, and cultures, with varying access to technology (in both their personal and scholastic contexts). Such research should also consider different schools within different provinces and social contexts as research settings, so as to develop a richer understanding of the phenomenon within South Africa.

- Further research could endeavour to develop teacher training initiatives to engage with both learners and their teachers to discover their technological needs and aspirations for such use both within and outside of the classroom. As such, contextually appropriate training which critically engages in contextual affordances may benefit both parties more than generic, 'one-size-fits-all' technological training might afford.

- Research which investigates learners' and teachers' conceptualisations regarding the use of particular technological tools within the classroom may provide detailed information regarding the affordances of specific tools. Such narrower focus could also inform training initiatives, especially those designed to engage with schools to provide discerning information regarding the most suitable tools to utilise in and outside of the classroom.

5.5 RESEACHER'S REFLECTION

It is through my own intrigue with learning technology and the potential to influence learning that led me to embark on such a research journey. I am not formally trained

in any form of technology or computer science, but my experiences as a teacher provided the impetus for further examination of the power that technology appears to hold over contemporary adolescents.

As I began to engage with the literature, I was challenged by the obstacle presented by the nature of technological innovation. Just as I unearthed one technological tool or opinion, another was declared null and void. Several times I revisited a site to discover with horror that it no longer existed! I developed a fascination with the world of learning technology. As such, I had to remain cognisant of the potential that such fascination afforded to introduce bias into the research. I became aware of my unique position when I began interacting with the teachers and learners in the data collection process; the generation with which I identified fell somewhat between that of the adolescents of the study and their teachers. To an extent, this afforded me the opportunity to connect to the perspectives of both parties. By the same token, I had to remain objective and allow the participants to inform my understanding of their own lived realities.

I really enjoyed engaging with the participants. I was struck by how eager they were to speak frankly about their experience with technology, for which I am extremely grateful as it provided such depth to the research. They afforded me the opportunity to challenge and reconstruct my own perceptions of the place of technology within education. I became so enthralled by the discussions in the focus group that I had to remind myself to ensure that the research questions were in fact answered, as well as keep my own perceptions from influencing those of the participants. I marvelled as the process of social constructivism played out right in front of my eyes – the participants collaborated in order to engage in an open discussion and as such, a holistic, collective perspective of learning technology and its affordances was born. I gained a true respect and admiration for the insight of adolescents in their own learning processes, which ignited the following determination for me, of which I will ardently advocate in the future: in discussions of education innovation, it is imperative to consult those for whom education is ultimately designed to serve – the learners. The enormity of the task of accurately portraying the participants' voices dawned on me, and as such, I engaged in routine personal reflection.

Upon completion of this research study, I have realised that social constructivism had in fact directed the entire research process; I was guided to a new understanding of learning technology through the mediation of the literature review and engagement with the participants. Even the process of qualitative research was mediated through consultations with my supervisor, the literature consulted, as well as the technology that I utilised to access such information. The guidance of such MKOs therefore scaffolded my development beyond my own ZPD of understanding, and I believe that I have emerged with a greater appreciation of the power of the social constructivist framework.

Whilst I have engaged in lengthy discussions in the past with researchers who engage in academic research, I could never have anticipated the true, tumultuous journey that accompanies such a study. Each step presented a new challenge, which called for perseverance, determination and personal reflection in order to transcend; research questions were developed and redeveloped, the literature review developed right through the research process as new literature discoveries were made, and logistical obstacles such as school holidays and participant extracurricular commitments required creative problem-solving. Looking back on the process, I feel privileged to have been afforded the opportunity to act on behalf of the learners to pen their story; an active construction of adolescent conceptualisation of the motivating effect of technology in education.

5.6 CONCLUSION

Whilst there are limitations to this research study, the information gleaned can be viewed as supplementing existing research, and as such, supports the development of a deeper understanding of the motivating effect of technology in education. Such research paves the way for further investigation into a field which has not, to the best knowledge of the researcher, received much attention when viewed from the learners' perspective. As such, there is extensive opportunity for further research into the field, and the results thereof would prove indispensible to develop programmes for critical engagement with the affordances of learning technology within South Africa. Finally, if technology is able to optimise the learning experience for learners and enables them to tap into their innate potential, every effort should be made to

provide learners with this opportunity, a sentiment that is echoed in the following words of Steve Ballmer, former CEO of Microsoft (Banting, 2010, p. 214):

> *"The number one benefit of information technology is that it empowers people to do what they want to do. It lets people be creative. It lets people be productive. It lets people learn things they didn't think they could learn before, and so in a sense it is all about potential."*

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ADDENDUM A

27 January 2014

The Ethical Committee: Stellenbosch University

TO WHOM IT MAY CONCERN

Letter of Consent – Casey Anley

This letter serves to convey my consent that Casey Anley conducts a survey with a select group of approximately twelve [redacted] Grade 11 students (and possibly some teachers too) regarding her study on "*The role of technology in motivating learning*".

The initial meeting with the Grade 11 students will take place on the school premises and subsequent interactions with the selected group of participants may take place after school hours.

[redacted] is a private school and is not linked to the Western Cape Education Department in any way.

Should you have any further queries in this regard you may contact me at the school.

Regards,

[redacted]

College Headmaster

ADDENDUM B

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
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Approval Notice
New Application

23-Apr-2014
Anley, Casey C

Proposal #: DESC-Anley/2014
Title: The role of technology in motivating learning.

Dear Ms Casey Anley,

Your **New Application** received on **06-Mar-2014**, was reviewed by staff members of the REC office on **27-Mar-2014** and was approved.
Please note the following information about your approved research proposal:

Proposal Approval Period: **27-Mar-2014 -26-Mar-2015**

Please take note of the general Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

Please remember to use your **proposal number** (**DESC-Anley/2014**) on any documents or correspondence with the REC concerning your research proposal.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Also note that a progress report should be submitted to the Committee before the approval period has expired if a continuation is required. The Committee will then consider the continuation of the project for a further year (if necessary).

This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki and the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health). Annually a number of projects may be selected randomly for an external audit.

National Health Research Ethics Committee (NHREC) registration number REC-050411-032.

We wish you the best as you conduct your research.

If you have any questions or need further help, please contact the REC office at 0218089183.

Included Documents:
DESC application
Research proposal_Anley
consent form
Questionnaire
REC application form
Permission letter

Sincerely,

Clarissa GRAHAM
REC Coordinator

ADDENDUM C

UNIVERSITEIT•STELLENBOSCH•UNIVERSITY
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PARTICIPANT CONSENT TO PARTICIPATE IN RESEARCH

LEARNER PERCEPTIONS OF THE MOTVATING ROLE OF LEARNING TECHNOLOGY IN EDUCATION.

Your child has been invited to participate in a research study conducted by Casey Anley (BA. PGCE. BEd Hons cum laude) from the Educational Psychology department at Stellenbosch University. The results of this research will contribute to Casey's Master of Educational Psychology thesis. Your child was selected as a possible participant in this study because he/she is a Grade 11 learner at the school that is being researched.

1. PURPOSE OF THE STUDY

The study is designed to determine teachers' and learners' perceptions of the motivating effect of technology used in education. The learner voice is the focus of the study, so the researcher aims to discover the learners' thoughts on how the use of technology can aid in their learning, help them to engage independently with the content and help them to become more autonomous learners.

2. PROCEDURES

If your child volunteers to take part in the study, the process will be as follows:

Step 1: Consent forms

There are two forms that need to be completed and returned to school by a predetermined date in order to participate in the study; a consent form to be signed by you as parent or guardian, and an assent form to be signed by your child.

Step 2: Questionnaire

Your child will be provided with a questionnaire that he/she can complete by hand in his/her own time and returned to school by a predetermined date. The questionnaire asks for information on technology usage at home and at school, attitude towards and competency regarding the use of technology. This questionnaire should take approximately 10 minutes to complete.

Step 3: Focus group

If your child is selected to form part of a focus group, he/she will join approximately seven other learners from the same class for a discussion led by the researcher on the topic. This discussion will run for approximately an hour, and will take place at a time and venue suited to all participants.

Step 4: Dissemination of data

The researcher and her supervisor will be the only people privy to data collected from the questionnaires, audio-recorded focus group and interviews. Each participant will receive a transcript of the audio-recorded data, and are invited to verify the accuracy of the transcriptions before the data is used in the research study. Data will be deleted from the researcher's computer upon conclusion of the study.

3. POTENTIAL RISKS AND DISCOMFORTS

The questions that will be asked in both the questionnaire and interview are not of an evocative, sensitive or disturbing nature. Participants are not obligated to answer any questions that they do not wish to answer. However, should your child experience any emotional reaction following either the questionnaire or interview, the researcher is very willing to organise counseling for your child.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Research concerning learning technology in South Africa is scarce, especially that which considers the learners' perspectives of technology. With the abundance of technological products available on the market, teachers and parents may question the value of these tools in an academic setting. This study can contribute to a deeper understanding of how technology can be used effectively in educational settings to enhance independent learning, thus advancing institutional reform, professional development and guiding parental support. Teachers may benefit from new insight into current, relevant modes of teaching and learning so as to facilitate the 21st century learner in individualized learning. It could also be to the advantage of learners who will gain more control over their own learning, tap into their inherent motivation to learn, ultimately ensuring a more enjoyable experience of education.

5. PAYMENT FOR PARTICIPATION

Participation in this research is voluntary; therefore your child will not be reimbursed for his/her time and effort in completing the questionnaire or partaking in the focus group or interviews.

6. CONFIDENTIALITY

The only people who will be privy to the data collected are the researcher and her study supervisor. Any information that is obtained in connection with this study and that can be identified with your child will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained through the use of pseudonyms, and the data will be locked in a filing cabinet, to which the researcher will be the only one to access. Any electronic information will be stored on the researcher's

personal computer and will be protected by password, as well as backed up on a password-protected hard drive, also stored in the locked cabinet.

The focus group discussion and interviews will be audio-recorded and your child will be given a copy of the transcription so as to verify that the information is in fact correctly and accurately transcribed, and that his/her participation in the research is not identifiable in the transcription. Your child has the right to review the audiotapes should he/she wish to do so. Only the research team will have with access to these audio recordings. Upon the conclusion of the research, the audio recordings will be erased.

Should the research be published in an academic journal, your child's identity will be protected through the use of pseudonyms, and his/her real name will not appear anywhere in the research.

7. PARTICIPATION AND WITHDRAWAL

You can choose whether to allow your child to participate in this study or not. If your child volunteers to be in this study, he/she may withdraw at any time without consequences of any kind. Your child may also refuse to answer any questions he/she does not want to answer and still remain in the study. The researcher may withdraw your child from this research if circumstances arise which warrant doing so.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact the researcher, Casey Anley, at ……. or ……, or her study supervisor, Mrs. Charmaine Louw, at cl1@sun.ac.za or……...

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development at Stellenbosch University.

SIGNATURE OF LEGAL REPRESENTATIVE

The information above was described to the research participant by the researcher, Casey Anley, in English and the research participant is in command of this language or it was satisfactorily translated to him/her. The research participant was given the opportunity to ask questions and these questions were answered to his/her satisfaction.

I hereby voluntarily consent that my child may participate in this study.

I have been given a copy of this form.

_____

Name of Participant

_____

Name of Legal Representative (if applicable)

_____ _____

Signature of Legal Representative Date

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to the participant and/or his/her representative _____. He/she was encouraged and given ample time to ask me any questions. This conversation was conducted in English and no translator was used.

_____ _____

Signature of Researcher Date

ADDENDUM D

	STELLENBOSCH UNIVERSITY

PARTICIPANT INFORMATION LEAFLET AND ASSENT FORM

TITLE OF THE RESEARCH PROJECT:

Learner perceptions of the motivating role of learning technology in education.

RESEARCHERS NAME: Casey Anley

ADDRESS: Claremont, Cape Town.

CONTACT DETAILS: ……..

This is an invitation to participate in a research study conducted by me, Casey Anley, from the Department of Educational Psychology at Stellenbosch University. The results of the study will contribute to a thesis for my Masters Degree in Educational Psychology. You were selected as a possible participant in this study as the purpose of the study is to investigate the motivating effects of technology in education.

1. PROCEDURES

If you volunteer to participate in this study, I would ask you to do the following things:

- Complete a written questionnaire which should take between 10 and 15 minutes to complete. The completed questionnaire will be collected by the researcher within a period of 2 weeks.

- If you are selected for the focus group interview, you will join 7-8 learners from your grade in a group interview regarding the motivating effect of technology in the classroom. The focus group interview shall be conducted at a time that is convenient for you, and I will liaise with you via your student affairs officer.

2. POTENTIAL RISKS OR DISCOMFORTS

All of the information that is gathered shall remain strictly confidential. All learners will remain anonymous. However, if you feel that discussing issues related to gambling may cause you some discomfort, it is advised that you inform me prior to participating in this study.

There are no sensitive or uncomfortable questions asked in either the questionnaire or the focus group interview, but should you feel uncomfortable following the research and wish to talk to somebody after the research, I would be happy to put you in touch with a professional.

3. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Hopefully together we can shed some light on the influence of technology used in education. This will help your school (and possibly others) to understand the role of technology in your class, which could influence the use of technology in classes in the future.

You may learn some interesting information about how you can use technology to get more out of your learning.

4. CONFIDENTIALITY

The only people who will be privy to the data collected are the researcher, her study supervisor, and a scribe who will sign a confidentiality agreement. Any information that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained through the use of pseudonyms, and the data will be locked in a filing cabinet, to which the researcher will be the only one to access. Any electronic information will be stored on the researcher's personal computer and will be protected by password, as well as backed up on a password-protected hard drive, also stored in the locked cabinet.

The interviews will be audiotape and you will receive access to a copy of the transcription so as to verify that the information is in fact correctly and accurately transcribed, and that your participation in the research is not identifiable in the transcription. You have the right to review the audiotapes should you wish to do so. The only people with access to these audiotapes are the researcher, her study supervisor, and the scribe. Upon the conclusion of the research, the audiotapes will be erased.

Should the research be published in an academic journal, your identity will be protected through the use of pseudonyms, and your real name will not appear anywhere in the research.

5. PARTICIPATION AND WITHDRAWAL

You can choose whether to participate in this study or not. If you volunteer to participate, you may withdraw at any stage. In addition, you may also refuse to answer any question that

you don't feel comfortable answering. However I, the researcher, may withdraw you from this research if circumstances arise which warrant doing so.

You are free to decide whether you would like to participate in this study or not, and can withdraw from the study at any time. You may also decide not to answer a question if you wish – this is your right. The researcher may withdraw you from this research if circumstances arise which warrant doing so.

6. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact the researcher, Casey Anley, at …… or ……, or her study supervisor, Mrs Charmaine Louw, at cl1@sun.ac.za or …….

7. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, please contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development at Stellenbosch University.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to me, the participant, by the researcher, Casey Anley, in a language that I understand. I was given the opportunity to ask questions and these questions were answered to my satisfaction. I was provided with the contact details of the researcher, her supervisor, and that of the Unit for Research Development.

I hereby voluntarily consent to participate in this study, and I have been given a copy of this form.

_____

Name of Participant

_____

Name of Legal Representative (if applicable)

_____ _____

Signature of Legal Representative **Date**

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to the participant and/or his/her representative _____ . He/she was encouraged and given ample time to ask me any questions. This conversation was conducted in English and no translator was used.

_____ _____

Signature of Researcher **Date**

ADDENDUM E

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CONSENT TO PARTICIPATE IN RESEARCH

LEARNER PERCEPTIONS OF THE ROLE OF LEARNING TECHNOLOGY IN MOTIVATING IN EDUCATION.

Population group: Teachers and Grade 11 learners**.**

You are asked to participate in a research study conducted by Casey Anley (*BA. PGCE. BEd Hons cum laude)* from the Educational Psychology department at Stellenbosch University. The results of this research will contribute to Casey's Master of Educational Psychology thesis. You were selected as a possible participant in this study because you are a high school teacher at the school that is being researched.

1. PURPOSE OF THE STUDY

The study is designed to determine teachers' and learners' perceptions of the motivating effect of technology when used in education.

2. PROCEDURES

If you volunteer to participate in this study, you will be asked to do the following things:

- Complete a questionnaire that should take between 10 and 15 minutes to complete. The research will return after 2 weeks to collect the questionnaires.

3. POTENTIAL RISKS AND DISCOMFORTS

The questions that will be asked in both the questionnaire and interview are not of an evocative, sensitive or disturbing nature. However, should you experience any emotional reaction following either the questionnaire or interview, I am very willing to organize counselling for you.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Research into the effect of technology use in the classroom will provide information that could be useful for schools to consider the use of technology in their education system.

You could gain some useful information and insight into how you could embrace technology in your teaching so as to empower your learners.

5. PAYMENT FOR PARTICIPATION

You will not unfortunately be reimbursed for your time and effort in completing the questionnaire.

6. CONFIDENTIALITY

The only people who will be privy to the data collected are the researcher and her study supervisor. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained through the use of pseudonyms, and the data will be locked in a filing cabinet, to which the researcher will be the only one to access. Any electronic information will be stored on my personal computer and will be protected by password, as well as backed up on a password-protected hard drive, also stored in the locked cabinet.

Should the research be published in an academic journal, your identity will be protected through the use of pseudonyms, and your real name will not appear anywhere in the research.

7. PARTICIPATION AND WITHDRAWAL

You can choose whether to participate in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The researcher may withdraw you from this research if circumstances arise which warrant doing so.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact the researcher, Casey Anley, at …… or ……, or her study supervisor, Mrs Charmaine Louw, at cl1@sun.ac.za or ……...

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development at Stellenbosch University.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to me by the researcher, Casey Anley, in English, and I am in command of this language or it was satisfactorily translated to me. I was given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

_____

Name of Participant

_____

Name of Legal Representative (if applicable)

_____ _____

Signature of Participant or Legal Representative **Date**

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to the participant and/or his/her representative _____. He/she was encouraged and given ample time to ask me any questions. This conversation was conducted in English and no translator was used.

_____ _____

Signature of Researcher **Date**

CODE:

ADDENDUM F

LEARNER QUESTIONNAIRE

Thank you for taking the time to complete this questionnaire concerning the role that technology plays in motivating learners to engage in their own learning.

This should take you approximately 10 to 15 minutes to complete. Some questions require that you tick boxes, whilst others require a written sentence or two, but instructions above the questions will tell you what to do for that particular question. Please be aware that some of the tables run onto the following page. All answers will remain anonymous and these questionnaires will be securely stored and destroyed after the research is completed.

1. Biological Information (Fill in the blanks)

1.1. Grade: ____ 1.2. Age: _____ 1.3. Gender: _____

2. Motivation

On a scale of 1 to 10 (I = not at all, and 10 = extremely important), how important is it for you to be motivated in order to learn something new? _____

3. Technology use at home

3.1. What kind of technology do you have in your household? (Tick the boxes that apply).

Technology	Don't know/ Not sure	Don't have	Shared with family	I have my own
INTERNET				
Dial-up internet access				
Broadband/DSL cable internet				
Wireless (WIFI) internet				
HARDWARE				
Desktop computer				
Laptop				
Tablet				
Cellphone				
Television				
Satellite				
Camera				
Video camera				
Radio/Stereo system				
Portable music player (E.g., iPod, MP3 player, CD				

Technology	Don't know/ Not sure	Don't have	Shared with family	I have my own
player)				
SOFTWARE				
Editing (e.g., Photoshop)				
Other: (please list)				

3.2. Of the technology types that you listed as present in your home, which of these do you find that you use most often, and for what purpose? (You can list more than one; just list them and indicate use from most used to least used)

_____

_____

_____

3.3. In a typical week, approximately how many hours do you spend doing each of these things OUTSIDE of school? (Tick the boxes that apply to you. If you never do any of these things, tick the zero box)

Activity	Hours spent per week			
	0	1-2	3-4	5+
Playing online games (computer/cell phone)				
Play offline games (Wii, Play Station, X Box, cell phone, computer/laptop/tablet)				
Programming/creating web pages				
Visiting social networking sites like Facebook/Twitter				
Watching video clips (YouTube, Vimeo, etc)				
Creating content like blogging, videoing and uploading, etc				
Photo storing and sharing (Tumbler, Flickr, Instagram, etc)				
Use the internet for homework or researching for projects, study, etc				
Reading books or magazines online/e-Reader				
Reading/watching the news online				
Buying/selling online				
Use a cell phone for communicating (talking, emailing – sending and reading incoming, text messaging, Whatsapp,				

Activity	Hours spent per week			
	0	1-2	3-4	5+
Mxit, BBM, Instagram, SnapChat, etc)				
Watch TV, movies, series, DVDs				
Listen to music on a mobile device (iPod, MP3 player, mobile phone)				
Using spreadsheets/word processor for homework (Excel, MS Word)				
Presentation software (PowerPoint)/Google presentation				
Using learning software programmes (e.g., Kumon)				
Other (please list):				

3.4. How often do you use technology for the following activities AT SCHOOL? (Tick the boxes that apply).

Activity	Time spent			
	Daily	Weekly	Monthly	Hardly ever/ Never
Taking notes in class				
Accessing the school network				
Collaborating with classmates for school group work				
Researching information for school on the Internet				
Learning programmes or activities (e.g., quizzes, practice of skills)				
Using MS Office (Word, Excel, PowerPoint)				
Working on a class blog				
Working with digital images/music/video for school work				
Making web pages/programming for school				
Social networking, e.g., Facebook/Twitter (for class exercise, not for own use)				
Other uses (please list):				

3.5. How important do you consider technology to be for your learning? Please explain your answer.

_____
_____
_____
_____
_____

4. **Technology and Learning Preferences**

4.1. Tick the boxes below that you would prefer teachers to use/allow the use of by learners for learning, INSIDE the classroom:

PowerPoint	☐	Learning websites (e.g., Mindset Learn)	☐
Video clips	☐	Social networks (e.g., Facebook/Twitter)	☐
Blogs	☐	Tablets	☐
Smartboards	☐	Laptops	☐
CD/MP3 player	☐	Desktop computers	☐
TV	☐	Search engines (e.g., Google)	☐
Mobile phones	☐	Learning DVDs (i.e., Maths Help)	☐
Camera	☐	Learning apps (work at own pace)	☐
Video recorder	☐		

Others (Please list): _____

4.2. Tick the boxes below that you would prefer teachers to use to support your learning OUTSIDE of the classroom:

Photocopied class notes	☐	Audio recordings of lessons	☐
Resources on school's network	☐	Links through Twitter	☐
Video recordings of lessons	☐	Online archives of past exams	☐
Typed textbook summary	☐	Teacher's blog	☐
Practice exercises/quizzes online	☐	Class blog	☐
Online readings/links to websites	☐		

Other: (Please list) _____

5. Technology and Competency

5.1. Rate your level of skill when using technology (Tick the box that applies).

Activity	Level of skill			
	No/little experience	Novice	Competent	I can teach others
Using MS Office (Word, Excel and PowerPoint)				
Searching for information on the internet				
Playing online or offline games				
Sending and reading email				
Programming/creating websites				
Blogging				
Editing music/images/videos				
Using a tablet				
Using a Smartphone				
Navigating YouTube				

5.2. How do you think that your ability or capability in using technology affects your learning?

_____

_____

_____

_____

_____

6. Attitudes to Technology

6.1. Look at the statements below and tick the boxes that most apply to you.

	Attitudes to technology	**Mostly disagree**	**Slightly disagree**	**Neutral/ No opinion**	**Slightly agree**	**Mostly agree**
1	I enjoy using technology in general					
2	I enjoy using technology in the classroom					
3	Technology intimidates me					
4	Technology helps me to improve my marks					
5	Teachers need to be good at using technology to use it in the class					
6	Teachers should show us how to use technology in our classes					
7	I feel inspired to learn more for myself when I use technology					
8	There are too many technical problems that take time to fix					
9	I like it when technology gives me feedback on my performance so that I can improve					
10	Technology can distract me from doing my schoolwork					

Thank you so much for your time in contributing to my research. It is much appreciated! ☺

ADDENDUM G

TEACHER QUESTIONNAIRE

Thank you for taking the time to complete this questionnaire concerning the role that technology plays in motivating learners to engage in their own learning.

This should take you approximately 10 to 15 minutes to complete. Some questions require that you tick boxes, whilst others require a written sentence or two, but instructions above the questions will inform you on what to do for that particular question. Please note that some of the tables run on to the following page. All answers will remain anonymous and these questionnaires will be securely stored and destroyed after the research is completed.

1. <u>Background Information:</u> (Please tick the box that applies to you)

1.1. *Gender:* Male ☐ Female ☐

1.2. *Teaching experience:*

First year teaching ☐ 1-4 years ☐
5-10 years ☐ 10+ years ☐
20+ years ☐

2. <u>Learning, Motivation and Areas of Instruction</u> (Answer in the space provided)

2.1. What does the concept ‘learning’ mean to you?

_____
_____
_____
_____

2.2. What does the concept ‘motivation’ mean to you?

_____
_____
_____
_____

2.3. Which learning areas do you currently teach, and to which grades?

_____

_____

_____

3. <u>Preferred teaching methodology</u> (tick the boxes of the answers that best apply to your personal teaching style)

3.1. My **preferred teaching style** can be described as:

Mostly teacher-directed (e.g., teacher-led discussion, traditional lecture style)	☐
More teacher-directed than student-centered	☐
Even balance between teacher-directed and student-centered activities	☐
More student-centered than teacher-directed (e.g., project-based learning)	☐
Mostly student-centered (e.g., cooperative learning, discovery learning)	☐

3.2. **Please explain your choice** for 3.1 above:

_____

_____

_____

_____

4. <u>Access to technology</u>

4.1. What types of technology do you and/or your learners use for teaching and learning at school? (Tick the boxes that apply. Select 'Other' and specify if there are other technology types that are used in your classroom).

Technology	Not used	In the classroom	In computer lab/media room
HARDWARE			
Desktop computers			
Laptop computers			
Tablets			
Projector			
Smartboard			
Music player			

Technology	Not used	In the classroom	In computer lab/media room
Camera			
Video camera			
Mobile phones			
SOFTWARE			
Learning tutorials (e.g., Kumon,)			
Word processing (e.g., MS Word)			
Spreadsheets (e.g., Excel)			
Presentation (e.g., PowerPoint)			
INTERNET			
School network access			
Internet for research			
Learning website (e.g., Mindset Maths)			
Social networking (Facebook/Twitter)			
Blogging			
Watching video clips (e.g., YouTube/SchoolTube/Vimeo)			
Creating websites			
Email			
Other (please list):			

4.2. How important would you say **access to technology is for learners' optimal learning**?

_____

_____

_____

_____

_____

5. Use of technology in your classroom

5.1. Tick the box that most applies to the use of each technology form in your classroom. If there are others that you use, please add them in the 'Other' space provided and specify)

Technology	Frequency with which the technology is used in your classroom for teaching and learning				
	Daily	**Few times a week**	**Once a week**	**Monthly**	**Hardly ever/not at all**
INTERNET					
Search engines (e.g. Google, Yahoo)					
E-mail					
Designated learning websites (e.g., BBC, Mindset Learn)					
Social networks (e.g., Facebook, Twitter)					
Blogs					
YouTube/SchoolTube					
School's network					
Other:					
SOFTWARE					
Microsoft Word (or equivalent)					
Microsoft Excel (or equivalent)					
Microsoft PowerPoint (or equivalent)					
Applications for learning ("Apps", e.g., Edu-Apps)					
Tutorial programmes (e.g., MathsTutor)					
Other:					
HARDWARE					
Computer (just teacher)					
Computers (learners)					

Technology	Frequency with which the technology is used in your classroom for teaching and learning				
	Daily	**Few times a week**	**Once a week**	**Monthly**	**Hardly ever/not at all**
Tablets (e.g., iPads)					
Projector					
Calculators					
SmartBoard (i.e., interactive whiteboard)					
Television					
DVD/VHS player					
Cell phones					
Cameras (digital/film/cell phone)					
Video cameras (digital/tape/cell phone)					
Personal music players (e.g., MP3, iPod)					
Other:					

5.2. Do you think that the use of technology in the classroom (both for teaching and by learners in their learning) **intrinsically (internally) motivates learners to engage in their own learning?** Please explain your answer.

6. Technological competency and training

6.1. **Competency:** How would you rate your **level of adeptness in using technology in the classroom?** (Please tick the box that best applies to you).

Unfamiliar (I do not know how to nor use technology in my classroom; computers make me nervous; I stick to the tried-and-true methods of teaching) ☐

Beginner (I have begun to learn, but I still need regular help; I am not yet completely comfortable to use the tools in the classroom) ☐

Average (I use a few tools and tricks in the classroom; I have gained confidence to use a few tools without many hiccups) ☐

Advanced (I can comfortably use a range of tools in the classroom, and consider technology to be quite important in the classroom) ☐

Expert (I comfortably and extensively use tools; I can teach others; technology forms a part of daily learning) ☐

6.2. **Training:** How much **training on using technology in the classroom** have you received to date?

_____

_____

_____

7. Opinion regarding technology in the classroom (Tick the boxes that match your response to the phrases that follow on from the statement in the heading below).

Technology in the classroom…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
7.1. Helps learners to become more independent in their learning					
7.2. Increases academic achievement					
7.3. Is too expensive and takes too long to learn and keep up to date					
7.4. Has changed the way I approach teaching					
7.5. Has left many teachers behind in terms of skill and impact in the classroom					
7.6. Can only be beneficial when there is parent support at home					
7.7. Provides an unnecessary power struggle between teachers and learners					
7.8. Helps to accommodate learners' individual learning styles					
7.9. Improves content retention					

Technology in the classroom…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
7.10. Improves learner collaboration					
7.11. Requires too much technical support to fix glitches, thus taking away learning time					
7.12. Enables learners to take pride in their work					
7.13. Helps to catch and hold learners' attention					
7.14. Is a distraction for learners					
7.15. Promotes communication skills (e.g., writing and presenting)					
7.16. Increases safety risks unnecessarily (e.g., cyberbullying, identity theft, access to pornography)					
7.17. Causes behaviour problems in the classroom					
7.18. Motivates boys to engage in learning more so than girls					

7.2. If your school was to become more technologically-centred, how do you think this would affect your teaching and your learners' learning?

_____

_____

_____

_____

_____

_____

Thank you for completing this questionnaire! Your contribution to my research is fundamental in gaining a full picture of the phenomenon being studied. Should you have any questions, or need clarity on any of the items in this questionnaire, please feel free to contact me at ……..

ADDENDUM H

FOCUS GROUP INTERVIEW SCHEDULE

1. Motivation

- Brainstorm what comes to mind when you think of the concept *motivation*.
- Describe the motivated learner.
- Internal motivation comes from within you, when there is no expectation of reward; you are motivated to do something because it has engaged you somehow. How do you know when you are internally motivated to learn something new?
- How do you know when you are not motivated to do something, and how does this affect your learning?
- What factors motivate you to want to learn in class?
- What factors make you lose motivation?

2. Technology

- Brainstorm what comes to mind when you think of technology in education.
- Learners in schools today have been referred to as the *Net Generation*. What do you think about this?
- Which of your subjects use technology in the classroom, and how does this affect your learning?
- What do you think are the benefits and challenges of using technology in the classroom?
- Do you feel that learners take responsibility for their own learning (i.e., are more self-regulated and intrinsically motivated) when they use technology?

3. Ideal environment

- Describe your ideal learning environment.

Examples of probes that can be used:

- Can you tell me a bit more about that?
- Can you explain that in a bit more detail?

  What makes you say that?

ADDENDUM I

AUDIT TRAIL OF RESEARCH STEPS

Date	Venue	Intention	Individuals concerned	Result
24 January 2014	Claremont	Schedule a meeting with the Principal to negotiate access to the school	Personal Assistant to the Principal	Meeting with Principal scheduled
27 January 2014	Principal's office	Negotiating permission to conduct research	Principal and Head of Student Affairs	Permission granted and dates negotiated
13 June 2014	Office of Head of Student Affairs	Drop off consent forms	Head of Student Affairs	Consent forms handed over
20 June 2014	Email	Pilot of questionnaires	Researcher and participants	Identification of applicable research modifications
21 July 2014	Office of Head of Student Affairs	Drop off questionnaires	Principal's assistant	Questionnaires handed over
4 August 2014	Office of Head of Student Affair	Pick up completed learner and teacher questionnaires	Head of Student Affairs	Questionnaires retrieved
14 August 2014	Classroom	Pilot interview	Researcher and participant	Identification of modifications required for focus group interview
14 August 2014	Classroom	Conduct focus group	Focus group participants	Focus group interview completed

ADDENDUM J

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TRANSCRIPTION AGREEMENT FOR ACADEMIC RESEARCH

Thank you for offering your services to transcribe the focus group interview to be conducted by myself, the researcher (Casey Anley) for my research that will contribute to my Master's degree thesis.

1. PURPOSE OF THE STUDY

The study is designed to determine learners' perceptions of the motivating effect of technology used in education. The learner voice is the focus of the study, so the researcher aims to discover the learners' thoughts on how the use of technology can aid in their learning, help them to engage independently with the content and help them to become more autonomous learners.

2. PROCEDURES

You have been approached to type out the communication from the audio recording of the focus group conducted with the 8 participants. The format will be discussed with you prior to the transcription.

Please take note of the following:

- It is imperative that you honour the confidentiality of the information of which you will be privy. No data emanating from the study may be discussed beyond our discussions.
- The audio files and typed transcriptions must be protected with a password on your computer. The password must not be shared outside of your and my personal capacity.
- After the typed transcriptions have been handed over to me, both the audio recordings and typed transcriptions must be deleted from your computer and from your recycle bin.

3. POTENTIAL RISKS AND DISCOMFORTS

There are no foreseen risks or discomforts.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Research concerning learning technology in South Africa is scarce, especially that which considers the learners' perspectives of technology. With the abundance of technological products available on the market, teachers and parents may question the value of these tools in an academic setting. This study can contribute to a deeper understanding of how technology can be used effectively in educational settings to enhance independent learning, thus advancing institutional reform, professional development and guiding parental support. Teachers may benefit from new insight, from a learner-focused perspective, into current, relevant modes of teaching and learning so as to facilitate the 21st century learner in individualized learning. It could also be to the advantage of learners who will gain more control over their own learning, tap into their inherent motivation to learn, ultimately ensuring a more enjoyable experience of education.

5. PAYMENT FOR PARTICIPATION

Your efforts will be reimbursed by me at the amount agreed upon by both you and me once the transcriptions have been made available to me and the audio recordings and transcriptions have been deleted from your computer and recycle bin.

6. CONFIDENTIALITY

The only people who will be privy to the data collected are the researcher, her study supervisor and you, should you wish to take on the position as transcriber. Any information that is obtained in connection with this study and that can be identify the participant will remain confidential and will only be disclosed with permission from parents or as required by law. Confidentiality will be maintained through the use of pseudonyms, and the raw data will be locked in a filing cabinet, to which the researcher will be the only one to access. Any electronic information will be stored on the researcher's and transcriber's personal computers and will be protected by password, as well as backed up on a password-protected hard drive. Should you come across any names mentioned in the transcription by accident, please do not include this in the transcription, and keep the information confidential. The findings of the research will be disclosed in the Master's thesis. Upon completion of the research, all data will be erased and destroyed.

7. PARTICIPATION AND WITHDRAWAL

It is up to you whether you accept the position of transcriber in this study. If you choose not to accept the position, payment will not be made.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact the researcher, Casey Anley, at …… or ……., or her study supervisor, Mrs Charmaine Louw, at cl1@sun.ac.za.

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation as transcriber without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development at Stellenbosch University.

10. SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to _____by _____ in English and I am in command of this language. I was given the opportunity to ask questions and these questions were answered to my satisfaction. I hereby voluntarily give my consent to become involved in this study as a transcriber and undertake to keep to the requests described in this document. I have been given a copy of this form.

PAUL HAWKINS
_____
Name of Transcriber


_____
Signature of Transcriber

_____
Date signed

11. SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____. He was encouraged and given ample time to ask me any questions. This conversation was conducted in English and no translator was used.

_____
Name of Researcher

_____
Signature of Researcher

_____
Date signed

ADDENDUM K

FOCUS GROUP INTERVIEW TRANSCRIPTION

Table 1: Description of symbols used in the focus group transcript

Description of symbols used in focus group transcript	
...	Indicates a short pause in time.
(pause)	Indicates an extended pause.
[ ]	Indicates a word or thought that has been included by the researcher to clarify the intended message, thought or idea expressed by the participant.
( )	Specifies a non-verbal expression such as a pause or laugh.
-	Indicates an interruption such as when one participant interrupted another and their speech was cut off.
< >	Indicates when an identifier has been removed

Table 2: Abbreviations of codes presented in the focus group transcripts

Abbreviated code:	**Code description:**
DM:	Description of motivation
DN:	Digital native
DT:	Description of technology
F:	Flow
LC:	Learning considerations
LE:	Learning environment
LM:	Lack of motivation
NI:	Negative influence on motivation
PI:	Positive influence on motivation
TE:	Technology's role in education
TU:	Technology use

Moderator: M

Participants: P1 to P8

		Transcript	Comments	Codes
1 2 3	M	Please would you state your names for the recording. This is to help me to identify you when I transcribe, and I won't use them in my findings.		
4	P1	<name>		
5	P2	<name>		
6	P3	<name>		
7	P4	<name>		
8	P5	<name>		
9	P6	<name>		
10	P7	<name>		
11	P8	<name>		
12	M	Thank you. You might have to come a little bit closer, <name>.		
13 14 15 16 17	M	Okay. So today there are two topics I would like us to discuss. The one is about motivation, the other one is about technology. We are going to start with motivation. Okay. I just want you to brainstorm what comes to your mind when you think of the concept motivation.		
18	P3	Are we supposed to say it?		
19 20	M	Yes, just throw out some ideas of what you think motivation is all about.		
21	P5	Like...**pushing yourself to do better**.	Pushing self to do better	Description of motivation (DM): Self-improvement
22	M	Okay.		
23	P6	**Not parents** pushing you.	Self-motivation (intrinsic)	DM: Self-improvement
24	M	Mmmm.		
25	P3	**Enjoying** what you're doing.	Enjoyment	Flow (F): Enjoyment
26	M	Enjoying what you doing.		

27	P8	Having an **end goal** that you want to **accomplish**.	Working towards a goal	F: Goal-directed behaviour
28	M	An end goal, okay. Nice.		
29		... (giggle)		
30	M	Would anyone else like to add anything?		
31		(pause)		
32 33 34	M	Okay I'm going to come to the second question then maybe that'll help with the first. Could you describe the motivated learner?		
35	P2	<name>.		
36	All	Hahahaha.	Name, not one of the study participants.	
37	M	Hahaha. What makes <name > a motivated learner?		
38	P1	He gets **everything right**.	Performance	Performance
39	All	Hahaha.		
40	M	He gets everything right? Okay. How is that?		
41		-		
42	M	Okay. So I wonder what makes <name > a motivated learner?		
43	P3	He's just a **smart person**. He **studies a lot**.	Intellect Effort exerted Practice	F: Effort
44	P4	I think he **practices**.		
45	P3	Yeah.		
46	M	Practice okay...interesting.	Enthusiastic, engaged	F: Excitement
47	P7	**Excited** to learn.	Time management	F: Time management
48	P5	**Manages his time**.		
49	M	Okay...		
50	P7	Ja, he **makes time**.	Time management	F: Time management
51	P4	He puts **effort** in.	Effort exerted	F: Effort
52	P2	**Still gotta work** [he exerts effort to work].	Effort exerted	F: Effort
53		-		

54	All	Hahaha.		
55	M	I missed that?		
56	All.	Hahaha...		
57	M	Okay...		
58	P4	He **knows what he wants to achieve** in life.	Self-driven towards a goal	F: Goal-orientated
59		Haha.		
60 61	P6	It's also like **encourage from yourself** and from **other people**...around you to **do better**. **Do well**.	Self- and outside encouragement Working towards self-improvement	DM: External and intrinsic motivation
62 63	M	Okay. Interesting. So encourage from yourself as well as from other people around you. Okay.		
64 65 66 67 68 69 70	M	Let's have a look at the next question. Internal motivation comes from within you when there's no expectation of reward. You are motivated to do something because it's engaged you somehow. How do you know when you are internally motivated to learn something new? ...When there's no expectation of reward – for instance, you're not going get a mark ... -		
71 72	P5	Well, when you're just **interested** in it and you **wanna know more** for yourself.	Intrigue and curiosity	F: Intrigue
73	M	Okay. How do you know that you interested in something?		
74	P4	When you just **want** to do it.	Intrigue	F: Intrigue
75	P7	Yeah.		
76	P6	It just like **catches your attention** and -	Intrigue	F: Intrigue
77	P1	When you **wanna know what happens at the end**.	Intrigue	F: Intrigue
78 79	P5	It's not...it's not really a **mission** to do it, you want to, you **wanna spend your time** doing that.	Does not require effort	F: Effort
80 81	P4	You... you have **no sense of time** when you're doing it, then **you enjoy it**, and **you just keep on working at it**.	Engaged, lose sense of time (Flow)	F: Engagement
82 83 84	M	Okay. So it's just time seems to pass you by and you are still engaged and you are still doing it? Okay...nice. Anything else? What do you think, <name>?		
85		(pause)		

86 87	P1	It doesn't feel like **you're making an effort**. Like a...you just..**you're doing it**....yeah.	Engaged, no effort, flow.	F: Engagement F: Effort
88	P2	Yeah.		
89 90	M	So it seems like there's this idea that ...there's no effort on your part, it just seems to come naturally?		
91	P1	Yeah.		
92 93	M	Alright. How do you know when you are not motivated to do something?		
94	P4	You **procrastinate**.	Procrastinate	Lack of motivation (LM): Procrastination
95	P6	You start making **excuses** not to do it.	Make excuses	LM: Excuses
96	M	Okay.		
97	P1	Or you **just don't do it**.	Avoid task	LM: Avoidance
98	P4	You **just don't do it**!	Avoid task	LM: Avoidance
99	All	Hahahahaha.		
100	M	Haha.		
101	P1	Go on **9Gag**. [9Gag is a mobile application picture gallery].	Replace task with enjoyable task to avoid it	LM: Replace task with more enjoyable
102	M	You..go on 9Gag?		
103	P2+ P3	Haha.		
104	M	Girls, what do you think?		
105		-		
106	All	Hahaha.		
107 108 109	M	So ... the next part of this question: how do you know when you are not motivated to do something, now: how does this affect your learning?		
110 111 112	P5	When you **put it aside** and **you don't put any effort into it** because if you do it you try and get it **done as fast as possible** 'cos you don't really wanna do it.	Avoidance, lack of effort. Rush it to get it out of the way.	LM: Avoidance LM: Effort LM: Rushing
113	M	Mmmm.		
114	P1	**You rush it** and you **don't learn anything new**.	Rushing prevents learning (it	LM: Rushing

			becomes a futile exercise)	
115	M	You don't learn anything if you rush it?		
116	P1	Yeah.		
117 118	P7	I suppose it becomes **tedious** and you aren't **willing to complete the task**.	Effort	LM: Effort
119	M	Okay. Nice.		
120 121 122	P6	Um, if you have something that you **don't like**, like I really don't like history so **I'll do my other homework first** and then I **end up not doing the history**.	Avoidance	LM: Avoidance
123	M	Okay. Interesting. Anyone else find that?		
124	All	Mmmm.		
125 126 127	M	Alright. What factors motivate you to want to learn in class and what factors make you lose motivation? Those demotivators...		
128	P1	**Teachers**...	Teachers	Negative influence on motivation (NI): Teachers
129	All	Hahahaha		
130 131	M	Okay let's break that up into two questions: So which factors make you want to learn in class?		
132	P7	When it's for **marks**.	Marks	Positive influence on learning (PI): Marks
133	M	Marks? Okay...		
134 135	P1	Also **teachers who make an effort**, that **show you they want you to learn** [concerned about learners' learning].	Teachers effort and concern	PI: Teacher effort
136	M	Mmmm...		
137	P2	They also -		
138	P5	Or they also.. do it in **interesting ways** like I know. .	Teachers make it interesting	PI: Teacher effort
139	P2	Yeah.		
140 141	P5	...In our Bio [Biology] class she'll **bring out like the skeleton** if we're learning about the bones...	Concrete learning	PI: Concrete learning
142	P6	More **interactive learning**.	Interaction	PI: Interaction
143 144	P5	...and like make it more like **interacting** and more **interesting** for people that don't really like it; at least they can **see it** and	Accommodates different learning	PI: Learning styles

145		you can **remember it in different ways**.	styles	
146	M	Okay, I see.		
147 148 149 150 151 152 153	P8	Um, I think if teachers are like really relaxed about their class and **you become relaxed and you don't do your work**, like my maths teacher... um... she picks on you [selects you to answer a question] while she's teaching and it makes you pay attention 'cos **you're scared** that she'll pick you when you're not listening so I think when you're **interacting** with the learners then we are **more willing to pay attention**.	Interactive teaching style Avoid punishment	PI: Interaction PI: Teaching style
154 155 156	M	Okay, so you like the idea of your teacher interacting with you, and trying to draw you into the subject and then trying to get you to talk to each other and teach other?		
157	P8	Mmmm...yeah yeah.		
158 159	M	Okay interesting. Anything else? (pause) What factors make you lose motivation?		
160	P4	Uuuummm. .		
161	P3	When **doing the same thing over and over again**.	Repetition	NI: Repetition
162	M	Repetition? Of the same thing?		
163	P1	Yeah, **repetition**.		
164	P3	**Still teachers**.	Teaching styles	NI: Teaching style
165	P4	Yeah.		
166	M	What do you mean?		
167	P4	Just umm. . -		
168 169 170 171 172 173	P1	Some teachers are just horrible they just okay... Okay, Accounting. I've found that half the time **they give us a Powerpoint and we have to go learn it**. Like, we'd never get **taught it**. So if you don't, if you really just don't wanna go do it on the day, you could **just screw yourself over** [if you don't apply yourself, you would not understand it]...	Teaching style (Technology used to replace teacher?) Own responsibility?	NI: Teaching style
174	M	Okay...		
175 176 177 178 179	P3	Uh, like, also with, like, **background knowledge** and information [you would need some background information in order to contextualise information] so just giving us the **bare facts to learn**, ya' know? That's, um, just doesn't make you motivated to learn.	No contextualisation	NI: Lack context

180	P1	Also we ask them questions and **they don't know the answer**.	Teachers inability to answer questions	NI: Teaching ability
181	M	Okay, interesting. So you want a context?		
182	P3	Mmm.		
183 184	M	Okay, and it sounds like you want confidence in your teacher that she knows what she's doing.		
185	P1	Or he.		
186	M	Or he. Excuse me, ja!		
187	P1	Haha...		
188		(pause)		
189 190	M	Right: technology. Let's brainstorm and talk about what comes to mind when you think of technology in education.		
191	P2	Uuuuuhhhh.....**Powerpoint**.	Technology tool: Powerpoint	DT: Powerpoint
192	M	Powerpoint.		
193 194	P6	Or like when you have to use your **phones** or **iPads** for **research** and stuff.	Technology tool: Phones, iPads Technology used for: Research	DT: Phones DT: iPads TU: Research
195	M	Okay...		
196	P5	Sometimes your **Facebook wall** (nervous giggle)...	Technology tool: Facebook	DT: Facebook
197	M	Mmmm...		
198 199	P8	Also other, like, **presentations**, like, sometimes we'll watch a **YouTube video** to make understanding better.	Presentation tool: YouTube Technology used for: Presentation and consolidation	DT: YouTube TU: Presentation PI: Consolidation
200	P5	Yeah.		
201	M	Okay.		
202	P2	Ja...**Videos**.		
203 204	M	Mmmm...So you said something interesting, you said "to make something more interesting or make it better"?...	Presentation tool: Videos	DT: Videos
205 206 207 208 209	P5	Ja, well to, like, also, with the **background thing** [gaining background information], if you watch like a **Youtube video** on it like they sometimes do those **crash courses**. . then it's like everything kind of **links together** really nicely, whereas if you've learnt it over a few weeks it puts it all in	Consolidating learning Self-tutoring	PI: Consolidation PI: Autonomous learning

210 211		together in one little like **twenty minute video** or something. It also helps you to **put it together by yourself**.	Condensed learning opportunities – fast-paced living! Synthesise for own learning	PI: Autonomous learning
212	M	Okay so it almost helps to summarize. ..		
213	P5+ P2+ P6	Yeah.		
214	M	...what you've been learning; consolidating it?		
215 216 217	P7	And then, also, if you hear the **same voice** over and over again and then you hear someone **different** then we, uh, **concentrate better**.	Engagement through novel perspective	PI: Engagement
218	M	Okay. So different voice, a different perspective?		
219 220 221	P3	Ja, the **different perspectives** from, 'cos one teacher might miss another, ag, **miss something out** that the **Youtube video** covers and then you just get the **full coverage** I guess.	Gives a complete learning experience and perspective	PI: Perspective
222	M	Okaaaay. So you almost get a broader picture then..		
223	P3	Yeah you get **different perspectives**.	Perspective	PI: Perspective
224		(pause)		
225 .	P4	Um... I think it should be just like an **additional extra thing** for.	Technology as a means to an end	Technology in Education (TE): Assistive tool
226	P7	...More **assistive**.	Assistive	
227	P4	. .extra..yeah more **assistive**.	Assistive	
228	M	Assistive? In addition to?...		
229	P4	Uh, to learning. Just for **additional information**.	An add-on to teaching/assistive tool	TE: Assistive tool
230 231	M	Okay. So in addition to traditional teaching methods... of pure almost lecturing type teaching?		
232	P4	Mm.		
233 234	M	Okay. Nice.... Learners in school today have been referred to as the 'net generation'. What do you think about this?		
235		(pause)		
236	P1	Net..		
237	P6	Net gen?		
238	P1	As in **internet**?	Have not heard of this term before	

239	M	Yes, Net. Internet.		
240	P6	As in oh…		
241	P1	Uhh ja…		
242	P3	Um...		
243		-		
244 245	P1	I'm on the internet, like, **every class like the whole way through**...	Continual use	Digital Native (DN): Continual use
246	All	Hahahaha.		
247	P1	So I'd have to agree.		
248 249	M	Okay. When you say "I'd have to agree"….what do you think makes you say that? What is it about the internet?		
250 251	P3	Well, like, I just moved into a new house and **I haven't had internet for like two days** and **it was like hell**.	Dependency on Internet	DN: Dependency
252	All, M	Hahahaha.		
253 254	P3	Um, yeah, you kind of **can't live without it anymore like**, **WhatsApp** or **Facebook** or like anything like that..	Dependency Technology types: Watsapp and Facebook	DN: Dependency
255	P6	Ja.		
256	P3	...You, you kind of **get used to it** and it comes like..		
257	P6	...It's almost like a **part of your daily routine**. .	Part of routine life	DN: Routine
258	P3	Yeah.		
259	P6	...like '**check Twitter, check Facebook'**...	Part of routine life	DN: Routine
260	M	Mmmm.		
261 262 263 264	P5	It also helps like ...It also helps with, like, **research** and all that kinda stuff so if you don't **understand something** it's easier to just look it up on the internet than. . .like, **make an effort** to go and find out more.	Research Decreases effort.	TU: Research PI: Effort
265 266	M	So I'm hearing that it's become a part of your life... it's convenience...		
267	P5+ P3	Yeah.	Technology use: Research	TU: Research

268 269 270 271 272 273 274 275	P8	I think that although it can help us in some subjects with, um, **research** and things, I think it **adds to procrastination** especially with sites when you scroll down and then it'll let the page end but then it'll **reload again** and then we just keep going and going (giggle) and it never stops. ..so I think with certain things like, especially like **Tumblr** and **Facebook** [are distracting], umm , . ..then these things, they're not helpful and I don't think they will help us to learn.	Distracting Procrastination	NI: Distraction NI: Procrastination
276	M	Hmmm...Interesting.		
277 278 279 280 281 282	P4	Um, also with the distractions, like, uh, we become quite **distracted** in classrooms when we have **access to these technologies**. ..and we sit in economics where **we're supposed to be learning**. Our **teacher does use interactive** websites yet the kids are **sitting in the back with their phones** and not interacting so…	Distractions Despite teachers' efforts to interact, learners are distracted	NI: Distraction NI: Distraction
283	M	Interesting...		
284 285 286 287	P1	Exactly just what <P4> said, it's kinda like when you get **bored**, you just take out your phone and go see if someone's **messaged you** or you go **play a game on your iPad** or something like that.	Used to quell boredom; become second-nature	DN: Routine
288	M	Okay. Interesting...So I'm hearing a lot of distractibility...		
289	P1	Ja.		
290	P6	Ja, very (giggle).		
291	P6	I think it's stopped recording [computer recording stopped].		
292	M	Ooh.		
293	P6	Everything's. . .just exiting (nervous giggle)		
294	All	(nervous giggles)		
295 296	M	It's okay that's why I've got double [recording devices]. Technology! Haha.		
297	All	Haha.		
298 299	M	Okay. So which of your subjects use technology in the classroom and how does this affect your learning?		
300 301 302	P2	Ummm...<teacher> uses **Powerpoint every lesson** and that helps I suppose, it's **better than a piece of paper** I guess [better than learning from printed material]....Umm...Biology..	Powerpoint. Technology used daily; Technology favoured over	TU: Powerpoint

303	P5	Yeah.	text	
304	P2	We watch like. .		
305	P5	...a **lot of videos**...**slideshows**...		
306 307	P2	Youtube videos, like, which confirm, kind of just **confirm that we know everything**.. uuhhh..	Consolidation (Authority of technology: assigned to 'filling in the blanks' that teachers could not fill!)	PI: Consolidation
308 309 310	P5	History as well. We do a lot of, like, **watching videos** and like you can look up interviews and stuff with **people that were there at the time**...		
311	M	Mmmm.		
312 313	P5	So you can see the **primary** aspects of it as well [first hand exposure].	More authentic	PI: Authentic
314	M	Okay...		
315 316 317 318 319	P8	Uuummm, just on what <p5> said, we **watch a lot of videos** in History and I think, um, sometimes it can be helpful but other times there's a **lot of extra information** that we don't need to know and then I find it's better when <teacher> just **tells us what we do need to know** because sometimes it's just	Authentic	PI: Authentic
320 321 322		**distracting** when we **watch too many videos over and over again**, then, um, I **just become relaxed** when I come into History and **I think I don't have to do any work**.	Overload of information Distracting, Lose focus	NI: Distraction NI: Distraction
323 324	P5	It's also quite **boring** sometimes, watching the same thing over and over again (giggle).	Repetition is boring	NI: Repetition
325	M	Hmmm...Interesting....		
326 327 328 329	P4	In our Accounting class, it's quite **useful** because he puts the various ledgers on the board. He's already got the **memo set out** so he can just put it up it, and **saves us time**. It's quite **convenient**.	Saves time Convenient	PI: Saves time PI: Convenient
330	M	Mmmm.		
331 332 333 334 335 336	P1	Um. Well, I know that, again, it all **depends on the teachers** because. .umm, I'm in the same Accounting class as <P4> so he does do those things. Someone who's in the other Geography class than us will be using a *lot* more technology 'cos our Geography teacher is like…..**he can't use technology**, **I'll just put it like that** (giggle).	Teachers use of technology Teachers who are tech-savvy use more technology	NI: Teachers' lack of technology skills
337	All	Hahahaha.	Judgment of teacher's tech skill	
338	M	I'm pleased you brought that up because that's one of the		

339 340		things that has come up in my research; that students get frustrated when teachers can't use technology...		
341	P1	Yup.		
342	P5	Ja.		
343 344	M	And it seems to detract from their learning. Do you think that's so?		
345 346 347 348	P3	Ja, umm, for example as <P1> said, the one teacher... he's **decided** that he's **been teaching for so many years** and it's **worked** so he's gonna stick with it, um, and he won't **accept**, like iPads or. .	Teachers resistant to technology	NI: Teacher resistance
349	P1	Like ***refusing*** **to use them**.	Teacher resistance	NI: Teacher resistance
350 351	P3	Or he won't like... (rolls arms to **indicate moving forward**) [Adapt with the times]		
352	All	Hahahaha.		
353 354	P3	Yeah or he won't like **interact with technology**. He'll just stick to the **same ways, same methods**...yeah.	Teacher resistance	NI: Teacher resistance
355	M	Interesting.		
356 357 358 359 360	P8	I think it's also important if they're gonna use a Powerpoint then they should **give us a copy of the Powerpoint** because there's no point doing the Powerpoint and then we don't have the notes 'cos then it's **distracting** to listen to both them and, like, look at the Powerpoint.	Learning style dependent Distracting	NI: Teacher discernment of technology use NI: Distraction
361 362	M	Mmmm. So you would prefer to have either the teacher or the Powerpoint at one time?		
363	P8	Yes.		
364 365	M	Okay. What do you think are the benefits and challenges of using technology in the classroom?		
366	P1	**Cheating**...	Cheating	LC: Cheating
367	P2	Cheating a lot.		
368	M	Cheating... Benefit or…?		
369	All	Hahahahaha.		
370	P2	No comment!		

371	All	Hahahaha.		
372 373	P7	On the not-cheating side I find it **more fun** working with electronics...	Enjoyment	PI: Enjoyment
374	M	Okay...I wonder why that is?		
375	P7	...More fun...(giggle)		
376	M	Okay.		
377 378 379 380	P3	Umm...big thing is the **distraction** side and also, um, kind of, **converting** if everyone wants to then convert [from traditional teaching and learning to utilising technology]. .then it's gonna take some time for everyone to convert...	Distraction Attitudes concerning conversion to full technology	PI: Distraction LC: Attitudes
381	M	Mmmmm...		
382	P3	...and to **afford an appliance**.	Affordability	TE: Affordability
383 384	M	Okay. So converting from normal pen-and-paper learning to...?		
385 386 387	P7	I actually find it, um, more easy to **get myself to work** if I'm doing it, like, on a tablet or on my laptop than...if **I actually have to write it**.	Engagement	PI: Engagement
388	M	Why'd you think that is?		
389 390 391	P7	**Just easier**...I suppose. I find it quite **tedious** writing so much...Especially when you have projects that you need to have help with **referencing**. .	Convenience Saves effort	PI: Convenient PI: Saves effort
392	M	Ja?		
393 394	P7	It takes a ***very* long time** to write all those references if you're writing them out, whereas you can **just type them**.	Saves time	PI: Saves time
395	P1	-		
396	M	What's that?		
397 398	P1	Harvard Generator actually **does the referencing for you**...so much easier... hahahaha.	Saves effort	PI: Saves effort
399	M	Hmmm...		
400 401 402 403	P8	Um, I think if we were to be **given computers to use during exams**, especially, like, History or English, that could be very beneficial because those are the **most difficult exams to finish** [in time] and with typing, if **you can learn to type fast**, you	Assists in attending to all work Removes	TE: Assistive tool

404 405 406 407 408 409 410		can **finish the exam as well as make corrections** and that **wouldn't be messy** so the people there wouldn't be a trouble with **handwriting**. 'Cos I know, um, my brother is dyslexic and he has huge issues with handwriting and he's got a **concession** to use computers and therefore he, um, with **spelling** it's much easier as well, 'cos you get the spell check... and that so I think that...	handwriting difficulty factor Saves effort	 PI: Saves effort
411 412 413	P7	- That would be a lot helpful 'cos I have trouble, like, finishing an exam cos I spend too much time **editing** then **typing would be much faster than my handwriting.**	Saves time	PI: Saves time
414 415 416	P1	Theoretically that's the point, though, for English. You're **supposed to know how to spell words** so **spell check's kinda cheating.**	Too assistive?	TE: Assistive tool
417	M	So spell check is cheating?		
418	P1	Technically, ja.		
419	M	What do you think? (to rest of group)		
420	P5	Hmmm...		
421		(pause)		
422 423 424 425 426 427	P4	Also another thing is when you're in class, **I think taking notes with your hand means you're working**. Your hand's actually much better [writing as opposed to typing] 'cos you **remember it - muscle memory**, you know, rather than typing on the computer and **not really engaging properly** with the class.	The act of writing helps one to engage with the material	LC: Opinions of learning
428 429	M	Okay. So you find that the actual act of handwriting helps you to take it in better?		
430	P4	Ja.		
431	M	Okay. Interesting...		
432 433 434 435 436 437	P8	Don't you think that, um, although we have to know how to spell words in English, everything is **technological now** and we use spell check [in life after school] that **it's not really cheating because you're not really gonna have to know that [spelling] when you're in the business world** 'cos you just use your computer so...	Technology as an assistive tool	TE: assistive tool
438 439	P2	Ja, but when you **spell the word *so wrong* spell check can't even fix it**!	Level of assistance	TE: Assistive tool
440	All	Hahaha.		

441	P8	Ja, but that's a different thing entirely... (giggles)		
442		(pause)		
443 444 445 446 447	P8	I think if they're going to do technology [convert to full technology use in schools]like the iPads then **they should allow us to use it in exams too** 'cos what's the point then? Then **we're learning a skill and then not being able to use it in times that we need it most**.	Assistive technology	TE: Assistive tool
448	M	Interesting. Anyone else want to add to that?		
449		(pause)		
450 451	M	Alrighty. Do you feel that learners are taking responsibility for their own learning? As in, are they more self-regulated?		
452		(pause)		
453 454 455 456	M	We spoke earlier about being intrinsically motivated, doing something without the expectation of a reward. Do you think that learners take more responsibility for their learning when they use technology?		
457		(pause)		
458 459 460 461 462	P6	I think there's an aspect of **distraction** because as we said you can play games or you can go onto the internet and **do things [other] than just working** so...especially if it's something that you **not really interested in** or it's quite **boring**, you can just **do something else**.	Distraction Procrastination Task-avoidance	NI: Distraction NI: Procrastination NI: Task avoidance
463 464 465	P7	But it might depend on **what kind of person you are**. Like I personally find that when I work on electronics that **I work better**.	Personal preference	TE: Personal preference
466	M	Better in what way?		
467	P7	Well……..I……..I **enjoy it more**.	Enjoyment	PI: Enjoyment
468	M	Mmmm...		
469 470 471 472	P2	I think that, um, students, at first, they will actually be more **responsible** at first...But then it'll just kinda **lead to the *normal* distractions** once they get used to, like, using electronics.	Initially cause responsible behaviour, then distractions occur	TE: Distraction
473 474 475	M	Interesting. Do you think it could go back [to learners becoming responsible once again]? So they start off responsible and then they lose it, so do you think it could		

476		return?		
477 478	P2	I don't think really, I think **it's just gonna stick to being a distraction in the classroom**.	Distraction, rather than causing autonomous learning	NI: Distraction
479	M	Okay. Interesting...		
480 481 482 483 484 485 486 487	P8	Ummm, if you're really passionate about something then it's **mostly your opinion that you'll be writing about**. But I think if you have, um, if you have a computer in front of you, and you can get access to internet and then maybe I think there could be **plagiarism** that could be going on with that, but also, um, you can **expand your perspective** by looking at other people's opinions online and then you can **maybe gain a better understanding.**	Access to open sources – plagiarism Expand perspectives Better understanding	TE: Plagiarism PI: Perspective
488 489	M	Okay, so you are using collaboration to further your understanding of something?		
490		(pause)		
491 492 493 494	P1	Um, just about the, you know about the organization and stuff [self-regulation]. **An organized learner is gonna stay an organized learner most of the time and a lazy learner is gonna stay a lazy learner**, if you understand what I mean.	Personality	TE: Personal preference
495 496	M	Hmmm...So you don't think technology's going to help much [to encourage self-regulation]?		
497 498 499	P1	It doesn't help it. It helps that you keep your end up, **keeping your notes all in one place** but then you'll do a <teacher> and wipe out the entire hard drive at some time.	Assitive: Technology could sabotage your efforts to be organised!	TE: Assistive tool
500	All	Hahahaha.		
501	P1	So it has its **benefits, it has its disadvantages**.		
502	M	So you think it depends on...		
503 504 505 506	P1	...the person. Also 'cos they're, um, an organized learner, **they'll constantly backup the hard drive** somewhere else, whereas the lazy learner's gonna be like, "oh, it'll be fine, it won't happen [to me]."	Personality	TE: Personal preference
507		(pause)		
508 509 510 511	M	Hmmm...Interesting. Earlier we spoke about the motivated learner, and it's interesting to hear you talk about the organized learner. Do you think organized and motivated are similar [concepts]?		

512	P2	Not always.		
513	M	Do you want to expand on that?		
514	All	(giggle)		
515	M	Alright, would anyone else like to comment on this?		
516		(pause)		
517	M	Okay last one. Describe your ideal learning environment.		
518		(pause)		
519 520	M	If you could design your own way of learning, what would it look like?		
521 522 523 524 525 526	P2	I think just using like **pen and paper** and just taking notes within the classroom. Maybe having a **voice recording** of the teacher just as a **backup for missed lessons**. Just having maybe technology as **a side** of like you getting additional information **without completely overtaking the whole learning experience.**	Technology as an aid	TE: Assistive tool
527	M	Hmmm...		
528 529 530 531 532 533	P8	Umm, I think it's sort of **impossible to describe our ideal learning environment when we've only been exposed to one**. So I think if people really want to discover what ideal learning environments are for different people then they should **allow us to experience many different environments first**.	Limited perspectives	LE: Limited perspective
534	M	How do you think you could get exposure to that?		
535 536 537 538 539	P8	Umm...I think maybe there could be **programmes**, for example, or studies like what you're doing and put students in, um, the **regular classroom environment** and then compare it to something like where it were **relaxed** and then **stricter** and then see where they **perform their best**.	Programmes – experiments Teacher influence Performance over enjoyment	LE: Experiments
540 541	P7	I also, uh, agree with <P2> how, um, maybe electronics should just be used as a more **assistive side option**.	Assistive tool	TE: Assistive tool
542	M	Hmmm...		
543 544	P7	But...like <P8> said, **also experiencing all the different environments** to see where one would perform best.	Exposure/experiments of different environments	LE: Experiments
545	M	Okay.		

546 547 548 549 550 551 552 553 554 555 556 557 558 559	P6	Um, another thing where I think is really beneficial is, like, **working in groups** sometimes. **Discussing it with other people**, not just the teacher, but like **other peers** who are at the same level as you 'cos you know like the teachers they teach it over and over again and **they know it really well**... but, um, if you speak to, like, say <P8> and I discuss History, it's like **we at the same level and we know the same basic things**, and then we can just go on to pool ideas, and then also with, um, <P2> and <P8's> thing saying that, um, like, in your ideal thing you should be **exposed to more** and then also **you should be able to choose what you wanna do**. **So some people would prefer pen and paper, and others will prefer to use technology** so I think there should be, like, **more options too that it can suit everybody.**	Discursive peer learning opportunities Technology option	PI: Collaborative learning TE: Personal preference
560	M	Mmmm...		
561	P1	Home. Hahaha.		
562	M	Home? What about home appeals to you?		
563	P1	My bed. Hahahaha.		
564	M	Do you think learning from home could be an option for you?	Environment requires some external regulation for some personalities	LE: Regulation
565 566	P1	Maybe haha. I don't think it'd work too well. I would probably **just fall asleep doing it**.		
567	M	Okay. I can understand that!		
568 569 570 571 572 573 574 575 576	P8	Um, I think also the **environment should depend on the subject** that we're doing because, um, subjects like Maths and Science, they need a lot of **discipline and practice**, then we shouldn't have something [devices] and they don't all need, um, electronics and things in **Maths and Science**. So in classes like those they shouldn't allow technology cos it's **distracting** but then, um, in classes say like English it's more creative and, um, **opinionated** so therefore in those environments, um, using the internet could be good.	Subject-based Distraction detracts from discipline and practice Technology affords creativity and widening perspectives	LC: Differing subject requirements
577 578	M	Mmmm. So you say Maths and Science don't need technology...		
579 580 581 582 583 584 585 586	P8	Well, in my opinion **I wouldn't use it there**. For example, um, I think <school> is quite, um, **strict** with the way the school is and, um, our Maths department's very good, but then, say, my brother goes to <school> and their Maths department **isn't very strict, cos the whole thing about them is the school is relaxed...**And their Maths department isn't good, but their English department's very good so I think that just demonstrates how some subjects are better suited to certain	Thinking of a particular technology device. Strict = no technology/distractions	LC: Different subject requirements

587		environments.		
588 589 590	M	Interesting. What do you think it is about those subjects and the environments that sometimes they meet and sometimes they clash?		
591 592 593 594 595	P8	Well, um, I think because in English you have to, if you're **under a lot of pressure**, then you're not likely to think out of the box and think of different perspectives, but with **Maths you need pressure** because, um, it's **all about time limits and, um, structure.**	Maths requires structure	LC: Different subject requirements
596	M	What does everyone else think about this?		
597	P1	Mmmm..		
598 599 600 601	M	Alright. Okay guys, I think those are all my questions. Do you have any last comments that you'd like to make, about what technology personally means to you or what you would like to see happen in schools?		
602 603 604 605 606 607 608 609 610	P8	Um, I personally wouldn't like **technology to come** [to be implemented on a grand scale at the school] next year. I.. I just I think it's a bit silly for them to say that we all need to buy iPads because, um, I was using my dad's iPad because I wanted to see how it worked and **I only used it for a week at school and then it just didn't work for me**. It's too difficult with trying to, um, **put everything on computers and on the iPad** and **with all your school notes**, as well I think it's too **complicated**.	Technology implementation Personal preference Complicated to implement	TE: Personal preference
611	M	Okay...		
612	P8	So I personally think they shouldn't.		
613 614 615	M	Would you like the option to work with pen and paper or have technology, and then open that up or would you say technology's...		
616 617	P8	Well, I think **everyone should have the option** if they want to but I personally don't want the options.	Choice	TE: Personal preference
618	M	Okay.		
619 620	P7	Also to add to that, **not everyone can afford a tablet** - they very expensive these days.	Expensive	TE: Expensive
621	M	Mmmmm...		
622 623	P7	So there should probably be an **option** to write or to use your electronics...'cos not everyone can go with electronics.	Choice	TE: Personal preference

624 625 626 627	M M	Mmmmm. Good point. (pause) Well, thank you so much for your wonderful cooperation and input, I really appreciate it!		

ADDENDUM L

LEARNER QUESTIONNAIRE TRANSCRIPTION

Table 1: Biographical details of learner questionnaire respondents (n = 21)

Respondent	Age	Gender
LQ 1	17	Male
LQ 2	17	Male
LQ 3	16	Female
LQ 4	17	Female
LQ 5	17	Female
LQ 6	17	Female
LQ 7	16	Female
LQ 8	17	Female
LQ 9	17	Female
LQ 10	17	Female
LQ 11	17	Male
LQ 12	17	Male
LQ 13	16	Male
LQ 14	17	Female
LQ 15	17	Male
LQ 16	17	Female
LQ 17	16	Male
LQ 18	17	Male
LQ 19	16	Male
LQ 20	17	Female
LQ 21	16	Male

Table 2: Learners' perceptions of the importance of motivation as a condition for learning

Respondents	Perception of importance on a scale of 1 to 10 (I = not at all, and 10 = extremely important)
LQ 1	9
LQ 2	*
LQ 3	8
LQ 4	8
LQ 5	9
LQ 6	7
LQ 7	8
LQ 8	5

Respondents	Perception of importance on a scale of 1 to 10 (I = not at all, and 10 = extremely important)
LQ 9	9
LQ 10	10
LQ 11	7
LQ 12	7
LQ 13	8
LQ 14	10
LQ 15	7
LQ 16	8
LQ 17	8
LQ 18	9
LQ 19	8
LQ 20	6
LQ 21	8

*No answer provided

Table 3: Spread of technology owned by learners by gender (The genders are indicated with the letters 'M' for male and 'F' for female)

Technology	Don't know/ Not sure	Don't have	Shared with family	I have my own
INTERNET				
Dial-up internet access	MMM F	MMMM FFFF	M	F
Broadband/DSL cable internet	M FF	F	MMMMM MMM FFF	
Wireless (WIFI) internet			MMMMM MMMM FFFFF FFFFF	MM
HARDWARE				
Desktop computer		MM FFF	MM FFFF	MMMMM M F
Laptop		MM	M F	MMMMM MMM FFFFF FFFF
Tablet		MMM F	FFFF	MMMMM MMM FFFFF
Cellphone			F	MMMMM MMMMM M FFFFF

Technology	Don't know/ Not sure	Don't have	Shared with family	I have my own
				FFFF
Television		M	MMMMM FFFFF FFFF	MMMMM F
Satellite		F	MMMMM MMMMM FFFFF FFF	
Camera		MM	M FFF	MMMMM MM FFFFF FFF
Video camera		MMM F	MMMM FFFFF FF	MMMM FF
Radio/Stereo system		MMM	MMM FFFFF FFF	MMMM FF
Portable music player (E.g., iPod, MP3 player, CD player)		MM	F	MMMMM MMMM FFFFF FFFF
SOFTWARE				
Editing (e.g., Photoshop)	M	MMMMM FFF		MMMM FFFFF FF
Other: VSCO cam			F	
Other: Gaming consoles				F

Table 4: Learners' indications of the most frequently used forms of technology
(Arranged in order of most to least frequently utilised)

Respondent	Technology use
LQ 1	TV, mobile phone, computer
LQ 2	laptop (leisure and schoolwork)
LQ 3	mobile phone, tablet, TV, laptop, desktop computer, camera, video camera, portable music player, radio system
LQ 4	mobile phone TV, laptop, tablet, stereo system
LQ 5	tablet (games, internet and pictures), laptop (school work, movies and internet)
LQ 6	mobile phone and tablet (social networking), portable music player (listening to music)
LQ 7	mobile phone (using wifi), laptop (using wifi), TV
LQ 8	mobile phone (communication), wifi and tablet (research and schoolwork), TV
LQ 9	laptop (schoolwork, gaming and internet browsing)
LQ 10	mobile phone, wifi, portable music device
LQ 11	mobile phone (communication with parents and friends), laptop (school work)

Respondent	Technology use
LQ 12	laptop (research and watching movies)
LQ 13	laptop, mobile phone, tablet (communication, social networking and gaming)
LQ 14	mobile phone (communicating with friends and family)
LQ 15	wifi (social networking, gaming, research)
LQ 16	mobile phone and laptop (social networking and school work); stereo system (music and relaxation), video camera
LQ 17	mobile phone (communication with friends and family), desktop (school work)
LQ 18	tablet and internet (work, entertainment and social networking), mobile phone (communication and social networking), desktop computer (work and entertainment)
LQ 19	laptop (projects/surfing the internet), mobile phone (social networking and communicating with friends and family)
LQ 20	mobile phone (communication), tablet (research)
LQ 21	mobile phone, desktop computer, tablet, TV

Table 5: Spread of time engaging in various technological activities outside of school hours by gender (the genders are indicated with the letters 'M' for male and 'F' for female)

Activity	Hours spent per week			
	0	1-2	3-4	5+
Playing online games (computer/cell phone)	MMMMM FFFFF FF	MMMM F	FF	MM
Play offline games (Wii, Play Station, X Box, cell phone, computer/laptop/tablet)	FFFFF	MMMMM M FFF	MM F	MMM F
Programming/creating web pages	MMMMM MMM FFFFF FFFF	F		MMM
Visiting social networking sites like Facebook/Twitter		M FF	MMMMM MM FF	MMM FFFFF F
Watching video clips (YouTube, Vimeo, etc)	F	MMMM FFFFF F	M F	MMMMM M FF
Creating content like blogging, videoing and uploading, etc	MMMMM MMMM FFFFF FF	M FF	M F	
Photo storing and sharing (Tumbler, Flickr, Instagram, etc)	MMM	MMMMM MM	M FFF	FFFF

Activity	Hours spent per week			
	0	1-2	3-4	5+
		FFF		
Use the internet for homework or researching for projects, study, etc		MMMM FF	MMMMM FFFFF F	MM FF
Reading books or magazines online/e-Reader	MMMMM MMM FFFFF FF	MMM	FFF	M
Reading/watching the news online	MMMM FFFFF FF	MMMMM MM FFF		
Buying/selling online	MMMMM MMMMM FFFFF FFFFF	M		
Use a cell phone for communicating (talking, emailing – sending and reading incoming, text messaging, Whatsapp, Mxit, BBM, Instagram, SnapChat, etc)		M F	M FF	MMMMM MM FFFFF FF
Watch TV, movies, series, DVDs	M	FFFFF	MMM FF	MMMMM M FF
Listen to music on a mobile device (iPod, MP3 player, cell phone)	M	MMM	MM FFFFF	MMMMM FFFFF
Using spreadsheets/word processor for homework (Excel, MS Word)	MM FF	MMMMM M FFFF	MM FFF	M
Presentation software (PowerPoint)/Google presentation	MMMMM FFF	MMMMM FFFFF F	M F	
Using learning software programmes (e.g., Kumon)	MMMMM MMMM FFFFF FFFFF	MM		

Table 6: Spread of time learners spend engaging in various technological activities at school

Activity	Time spent			
	Daily	Weekly	Monthly	Hardly ever/ Never
Taking notes in class	√√√	√√√√√	√√	√√√√√ √√√√√ √
Accessing the school network	√√√√√ √√√√√	√√√√	√	√√√√√
Collaborating with classmates for school group work	√√√	√√√√√ √√√√√ √	√√√√	√√√
Researching information for school on the Internet	√√√√√ √√√	√√√√√ √√√√	√√√√	
Learning programmes or activities (e.g., quizzes, practice of skills)		√√	√√√	√√√√√ √√√√√ √√√√√ √
Using MS Office (Word, Excel, PowerPoint)	√√√√	√√√√√ √√√√	√√√√√ √	√√
Working on a class blog				√√√√√ √√√√√ √√√√√ √√√√√ √
Working with digital images/music/video for school work		√√√√√ √	√√√√√ √√√√	√√√√√ √
Making web pages/programming for school	√√√			√√√√√ √√√√√ √√√√√ √√
Social networking, e.g., Facebook/Twitter (for class exercise, not for own use)	√√	√√	√	√√√√√ √√√√√ √√√√√ √
Other uses (please list): Distracting sites that impair learning	√			

Table 7: Learners' perceptions of the importance of technology for learning

Respondent	Opinion
LQ 1	Not too important in my opinion
LQ 2	Important as a tool the teacher uses t present information and for our research but other than that not very important.
LQ 3	I believe technology is extremely helpful in accessing information quickly and efficiently however I also believe that writing notes on an iPad is unnecessary and that is more useful to write on paper.
LQ 4	I consider technology to be very important. It is a means of communicating between classmates and sometimes teachers. Knowledge can be gained through the use of technology, and the convenience of things is important.
LQ 5	Very important, I need to be able to access information at any given time and technology helps me to do that.
LQ 6	I see technology as the future of learning. Easy communication, organization and access to information is available due to technology. Technology also allows more creative/organized presentations.
LQ 7	The internet plays a huge role in writing essays on all topics (allows further insight and new perspective) and most other homework tasks, especially those I struggle with.
LQ 8	Very important – cannot do without it. Technology is necessary to research information for projects, access past papers and additional resources not given in class.
LQ 9	Reasonably important, technology makes projects and assessments easier and less time consuming.
LQ 10	I don't believe that learning off an ipad/laptop (devices) is better than having physical notes. However, that is only my personal opinion. Each learner is different.
LQ 11	I mainly use it for research for projects. Otherwise its not very important and is a bit of a distraction.
LQ 12	Technology plays a minor role for my learning. I don't think they are as effective as engaging with the teacher or physically taking notes.
LQ 13	I find it generally important: it helps organize your life and keep extra information I would otherwise forget.
LQ 14	I think it is very important because it makes me more interested in the subject. Our generation learns more through visuals and examples from society thus using technology in learning is very beneficial.
LQ 15	Technology allows me to research and get additional information if I do not understand something, this is beneficial to me, so technology is important in helping me learn, but is not essential.
LQ 16	Very important; skyping with friends to have different opinions, finding out homework one has missed and looking over videos on concepts one does not understand.
LQ 17	Technology is very important to easily and interestingly inform oneself. Visuals are very important to many students currently to learn effectively.
LQ 18	I find technology extremely useful when it comes to learning. The plethora of resources online and the reduction in heavy textbooks as well as learning apps are all major positives, but I still think person-to-person and physical learning take precedence over technology.
LQ 19	I see technology as being rather important for learning out of school and in school. Reason is that most people (90% in my opinion) return to their homes and use a form of technology for something. If we could bring that into use for learning, it would help out a lot and allow students to contact, access resources and other thing without being at school over a cloud

Respondent	Opinion
	system for storage.
LQ 20	It is extremely important when doing projects for research
LQ 21	While I don't classify technology as vital to learning, I definitely think it makes school more entertaining and offers a faster, easier alternative to many forms of work that may have otherwise been extremely taxing (such as creating spreadsheets)

Table 8: Spread of learners' preferences of technology tools to support learning in the classroom

Technology tool	Tally of preferences
Powerpoint	√√√√√ √√√√√ √√√√√
Video clips	√√√√√ √√√√√ √√√√√ √√√√√
Blogs	√
Smartboards	√√√√√ √√√√√ √√√√
CD/MP3 player	√√√√√ √√√
TV	√√√√
Mobile phones	√√√√√ √√√√√
Camera	√
Video recorder	√√√
Learning websites	√√√√√ √√√√√ √
Social networks	√√√√√ √
Tablets	√√√√√ √√√√√ √√√
Laptops	√√√√√ √√√√√ √√√
Desktop computers	√√√
Search engines	√√√√√ √√√√√ √√√√√ √√√√√
Learning DVDs	√√√√√ √√√√√ √
Learning apps	√√√√√ √√√√√ √√√√√ √
Others	

Table 9: Spread of learners' preferences of technology tools to support learning outside of the classroom

Technology Tool	Tally of preferences
Photocopied class notes	√√√√√ √√√√√ √√√√√ √√
Resources on school's network	√√√√√ √√√√√ √√
Video recordings of lessons	√√√√√ √√√√√ √
Typed textbook summary	√√√√√ √√√√√ √√√√√
Practice exercises/quizzes online	√√√√√ √√√√√ √√√√√
Online readings/links to websites	√√√√√ √√√
Audio recordings of lessons	√√√√√ √√√√√
Links through Twitter	√
Online archives of past exams	√√√√√ √√√√√ √
Teacher's blog	√√√√√ √√
Class blog	√√√√√ √
Other: Sharing applications i.e. Dropbox - access notes anywhere	√

Table 10: Spread of learners' perceived capability in using various technology tools by gender (the genders are indicated with the letters 'M' for male and 'F' for female)

Technology tool	Perceived level of skill			
	No/little experience	Novice	Competent	I can teach others
Using MS Office (Word, Excel and PowerPoint)		M F	MMM FFFFF FFF	MMMMM MM F
Searching for information on the internet		M	MM FFFFF FF	MMMMM MMM FFF
Playing online or offline games	FFFFF	MM FFF	M F	MMMMM MMM F
Sending and reading email	F	M F	MMMMM FFFFF F	MMMMM FF
Programming/creating websites	MMMMM MM FFFFF FF	M FFF		MMM
Blogging	MMMM FFFFF	MM FFFF	MMMM	M F
Editing music/images/videos	M F	M F	MMMMM M FFFFF F	MMM FF
Using a tablet	M	FF	MM FFFFF	MMMMM MMM FFF
Using a Smartphone	M		M FF	MMMMM MMMM FFFFF FFF
Navigating YouTube			M FFFFF	MMMMM MMMMM FFFFF

Table 11: Learners' opinions on the influence of capability to use technology on learning

Respondent	Opinion
LQ 1	I think that in today's society technology plays a big part in learning for me. I would rather use handwritten notes but one must be capable in order to keep up.
LQ 2	Not a lot, only affects in terms of me not being able to research for work and type out projects and homework
LQ 3	It is definitely imperative to know how to use technology as the world is constantly becoming more technically advanced.
LQ 4	It allows for my learning to expand because through technology, I am everyday evolving and learning new things from and about different places, people and subjects all over the world.
LQ 5	I am able to understand information given to me although when teachers do not understand the technology it takes away from my learning.
LQ 6	Students who are fully capable and confident with technology and programmes tend to benefit more while others may be fearful due to their lack of knowledge and therefore little gain.
LQ 7	I still prefer handwritten notes and actual textbooks so my capability only is necessary when using word, which is fairly simple. In the past I have found excel difficult to navigate.
LQ 8	Technology can be distracting, however being able to use technology appropriately gives me access to past papers, additional notes/information and allows me to stay in contact with my teachers/class through homework groups. Not knowing how to do this would limit my learning and make me less efficient and knowledgeable.
LQ 9	Knowing how to use various programs and applications on my laptop makes doing projects a lot less tedious as the information is at your fingertips.
LQ 10	The ability to use technology and understanding how to use search engines properly is important.
LQ 11	It helps me a lot with researching info for projects. It also helps me keep track of my tasks ahead.
LQ 12	Learning with technology can be quite distracting and should be used as a source of extra enrichment after school hours.
LQ 13	It allows easy access for information but can distract and discourage learning
LQ 14	As I am very able to use technology it distracts me from my learning as I use it for other purposes rather than to gain information about a specific topic or subject. I would rather use it for social purposes than for learning reason
LQ 15	I see technology as a big distraction when it comes to learning although used correctly it can be a great asset to the learning process. It has positive and negative impacts
LQ 16	I think it greatly improves my ability. Finding out new techniques and creating summarized notes depending on your learning style.
LQ 17	My ability with technology being pretty competent helps my learning greatly due to my research time is shortened and my ability to use apps for work is very helpful. Example: MS Word.
LQ 18	Being competent with technology is critical in today's world. Effective use of technology helps a lot in my learning, because if there is any section of work I cannot understand, there is a wealth of tutorial videos and exercises online to aid me in my learning of the topic.

Respondent	Opinion
LQ 19	It affects it a lot, if you do not know how to navigate phone app/website etc. learning would be difficult for the learner as on the other hand the learner that can use his device/technology correctly will have the greatest improvement both with work ethic and marks in the future.
LQ 20	It gives for excellent learning, leading to more work being done.
LQ 21	It allows for more efficient learning as I can competently use programs such as excel without pausing and searching for help.

Table 11: Spread of learners' attitudes with regards to technology by gender (the genders are indicated with the letters 'M' for male and 'F' for female)

Attitudes to technology	Mostly disagree	Slightly disagree	Neutral/No opinion	Slightly agree	Mostly agree
I enjoy using technology in general				M FF	MMMMM MMMMM FFFFF FFF
I enjoy using technology in the classroom	F	MM F	FFF	MMMMM M FFF	MMM FF
Technology intimidates me	MMMMM MMM FFFF	MM FFF	F	M F	F
Technology helps me to improve my marks		MMM FFF	MM FFF	MMMM FFFF	MM
Teachers need to be good at using technology to use it in the class			MM F	MMM FFF	MMMMM M FFFFF F
Teachers should show us how to use technology in our classes	M	M FFFF	MMMMM FFF	MMM F	M FF
I feel inspired to learn more for myself when I use technology		FF	MMM FF	MMMMM FFFF	MMM FF
There are too many technical problems that take time to fix	MMM F	MMMM FFF	FF	MMM FFFF	
I like it when technology gives me feedback on my		M	FF	MMM	MMMMM MM

Attitudes to technology	**Mostly disagree**	**Slightly disagree**	**Neutral/No opinion**	**Slightly agree**	**Mostly agree**
performance so that I can improve		F		FFF	FFFF
Technology can distract me from doing my schoolwork	M		FF	MM FFFF	MMMMM MMM FFFF

ADDENDUM M

TEACHER QUESTIONNAIRE TRANSCRIPTION

Table 1: Background Information of teacher respondents

Respondent	Gender	Teaching experience	Learning areas	Grades
TQ 1	F	5-10	English HL	8-10
TQ 2	F	5-10	Afrikaans FAL	8-12
TQ 3	M	20+	History	9-12
TQ 4	M	5-10	Accounting; EMS	10-12 8-9
TQ 5	F	20+	Dramatic Arts	8-12
TQ 6	F	10+	Maths Maths Lit Natural Science	8,10,11 12 9

Table 2: Teachers' perceptions of the terms 'learning' and 'motivation'

Respondent	Perception of the term 'learning'	Perception of the term 'motivation'
TQ 1	The growth and development of the self as a result of exposure to new information or experience or information and experience internalized in a new way. An ongoing process in a well-adjusted person.	That which drives a person to attain, whether internal or external.
TQ 2	Overall growth in knowledge, skills, values, understanding, empathy > applicable to all facets of life!	The will to do something and understanding *why* you need to do something.
TQ 3	Learning means being able to draw connections and conclusions based on prior knowledge.	Motivation means wanting to spend time learning when you could be doing other stuff.
TQ 4	Understanding new concepts so that you can develop new skills which can help you to contribute in a community, aiding growth and development of all those around you.	Something which creates a desire in you to do something to the best of your ability.

Respondent	Perception of the term 'learning'	Perception of the term 'motivation'
TQ 5	To build on existing knowledge in order to expand a world view. A concept, a personal interpretation and understanding. Learning must mean skills development rather than mastery of content only.	To encourage a student to love, and respect the acquisition of knowledge.
TQ 6	Students need to learn concepts and ideas in Maths and Science and then they need to be able to both reproduce and produce concepts. So learning is about old knowledge and using that knowledge to develop their own ideas.	It is the self-confidence and desire to do a task or to learn.

Table 3: Teachers' preferred teaching methodology

Respondent	Teaching style	Explanation
TQ 1	More teacher-directed than student-centered	I teach junior high – they need a fair amount of leadership and boundaries as I have experienced in general that their motivation is external.
TQ 2	More teacher-directed than student-centered	I provide the structure for lessons, but because our students have NO exposure to Afrikaans, I also have to provide all content. I would love to have the students more 'in control', but then every lesson would be in English.
TQ 3	Even balance between teacher-directed and student-centered activities	Students need direction > teacher-directed learning is important. They don't always know what they don't know. They then need to be empowered to learn themselves.
TQ 4	More teacher-directed than student-centered	Many new concepts need to be explained in Accounting, and with so much of syllabus to cover in the year most classes tend to be more teacher-directed.
TQ 5	Mostly student-centered, even balance between teacher-directed and student-centered activities and mostly student-centered	My approach depends completely on what I want to achieve, or what I want my students to achieve.
TQ 6	More teacher-directed than student-centered	I currently teach mainly to the 'weaker' maths students who struggle with project based or discovery learning.

Table 4: Spread of technology tools used in the classroom for teaching and learning

Technology	Not used	In the classroom	In computer lab/media room
HARDWARE			
Desktop computers	√√√	√	√
Laptop computers	√	√√√√√	
Tablets		√√√√√ √	
Projector		√√√√√ √	
Smartboard	√√√√		
Music player	√	√√√√√	
Camera	√√	√√√	
Video camera	√	√√√√	
Mobile phones	√	√√√√√	
SOFTWARE			
Learning tutorials (e.g., Kumon,)	√√	√√	
Word processing (e.g., MS Word)	√	√√√√	
Spreadsheets (e.g., Excel)	√	√√√√	
Presentation (e.g., PowerPoint)		√√√√√ √	
INTERNET			
School network access		√√√√√ √	
Internet for research		√√√√√ √	
Learning website (e.g., Mindset Maths)	√√√	√√	
Social networking (Facebook/Twitter)	√√√√	√	
Blogging	√√√√		
Watching video clips (e.g., YouTube/ SchoolTube/Vimeo)		√√√√√ √	

Technology	Not used	In the classroom	In computer lab/media room
Creating websites	√√√√		
Email	√	√√√√√	

Table 5: Teachers' perceptions of the importance of access to technology on learners' learning

Respondent	Importance assigned to the access to technology required for learners to learn
TQ 1	Important. When the focus of teaching is more about how to find information rather than memorizing it, technology helps in sourcing information. Whether this helps with learning all the time is hard to assess – technology can also be distracting.
TQ 2	Extremely. Negative attitudes towards my subject are a major problem – using technology is one way in which we get our students to be more open-minded about the subject.
TQ 3	Very important as we are now in a technological age and students are digital natives – education needs to keep up with their life style.
TQ 4	It' becoming more and more important as information becomes more freely available.
TQ 5	Absolutely imperative
TQ 6	Very important. The sheer volume of resources cannot be replaced by one teacher. Maths and science require a lot of practice and consolidation.

Table 6: Spread of teachers' indicated frequency of use of technology within the classroom

Technology	Frequency with which the technology is used in the classroom for teaching and learning				
	Daily	Few times a week	Once a week	Monthly	Hardly ever/not at all
INTERNET					
Search engines (e.g. Google, Yahoo)	√√	√√√√			
E-mail	√√√√	√			√

Technology	Frequency with which the technology is used in the classroom for teaching and learning				
	Daily	**Few times a week**	**Once a week**	**Monthly**	**Hardly ever/not at all**
Designated learning websites (e.g., BBC, Mindset Learn)		√	√	√√	√√
Social networks (e.g., Facebook, Twitter)		√			√√√√
Blogs				√	√√√
YouTube/SchoolTube	√	√√	√	√	
School's network	√√√	√	√		√
SOFTWARE					
Microsoft Word (or equivalent)	√√√√	√√			
Microsoft Excel (or equivalent)	√√√	√√		√	
Microsoft PowerPoint (or equivalent)	√√√	√√	√		
Applications for learning ("Apps", e.g., Edu-Apps)	√		√√√√	√√	
Tutorial programmes (e.g., MathsTutor)			√		√√√√
HARDWARE					
Computer (just teacher)	√√√√√ √				
Computers (learners)		√√	√		√√√
Tablets (e.g., iPads)	√	√√	√√√		
Projector	√√√√√		√	√	
Calculators	√√				√√√
SmartBoard (i.e., interactive whiteboard)					√√√√√
Television					√√√√
DVD/VHS player	√√			√	√√√√
Cell phones	√	√	√√√	√	√
Cameras (digital/film/mobile phone)	√		√	√√√	√√

Technology	Frequency with which the technology is used in the classroom for teaching and learning				
	Daily	Few times a week	Once a week	Monthly	Hardly ever/not at all
Video cameras (digital/tape/mobile phone)	√			√√√√√	√
Personal music players (e.g., MP3, iPod)	√	√√		√	√

Table 7: Teachers' opinion regarding the ability of educational technology to intrinsically motivate learners

Respondent	Position	Opinion
TQ 1	Educational technology may not have the potential to intrinsically motivate learners	That motivation is too personal. If anything, technology can be distracting or can be used to bribe learners.
TQ 2	Educational technology has the potential to intrinsically motivate learners	Technology is an integral part of teenager's lives. The less we use technology in teaching, the more far removed from their reality our subject becomes. Teaching with technology makes learning 'real' and relevant to their lifestyles.
TQ 3	Educational technology has the potential to intrinsically motivate learners	It makes learning relevant and connects with our everyday life experience. Knowledge/information is now at our fingertips – we need to learn how to access and evaluate it.
TQ 4	Educational technology has the potential to intrinsically motivate learners	When learners can engage with technology there is added motivation. Learning can be made far more visual which makes a different across the board.
TQ 5	Educational technology has the potential to intrinsically motivate learners	In terms of research. Using YouTube for existing, past performances.
TQ 6	Educational technology may not have the potential to intrinsically motivate learners	I don't think it does for all students. My maths class told me they prefer it when I work on the board in my own handwriting. Otherwise the technology just distracts them.

Table 8: Spread of teachers' indicated perceived competency to use technology in the classroom

Perceived competency	Tally
Unfamiliar (I do not know how to nor use technology in my classroom; computers make me nervous; I stick to the tried-and-true methods of teaching)	
Beginner (I have begun to learn, but I still need regular help; I am not yet completely comfortable to use the tools in the classroom)	
Average (I use a few tools and tricks in the classroom; I have gained confidence to use a few tools without many hiccups)	
Advanced (I can comfortably use a range of tools in the classroom, and consider technology to be quite important in the classroom)	√√√√√
Expert (I comfortably and extensively use tools; I can teach others; technology forms a part of daily learning)	√√

Table 9: Training that teachers have received to utilise technology n the classroom

Respondent	Training indicated by teachers
TQ 1	Some training from the school. A lot is self-taught or picked up from others informally.
TQ 2	Nothing that has taught me anything new.
TQ 3	Difficult to answer – I upskill myself on a daily basis.
TQ 4	Small slot once a week in staff meetings. iPad training a few times a term.
TQ 5	General training which does not always serve me in terms of iPads. However, completely comfortable in other areas.
TQ 6	A little bit. Most of it is not helpful. I have taught myself mostly.

Table 10: Spread of teachers' opinions regarding the use of technology in the classroom

Opinions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Technology helps learners to become more independent in their learning				√√√√√	√
Technology Increases academic achievement		√√	√	√	√√
Technology is too expensive and takes too long to learn and keep up to date		√√√	√√√		
Technology has changed the way I approach teaching				√√√√	√√
Technology has left many teachers behind in terms of skill and impact in the classroom		√	√	√√√	√

Opinions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Technology can only be beneficial when there is parent support at home	√	√√	√	√√	
Technology provides an unnecessary power struggle between teachers and learners	√√	√√	√	√	
Technology helps to accommodate learners' individual learning styles			√	√√√	√√
Technology improves content retention	√	√	√√	√√	
Technology improves learner collaboration		√√	√	√√√	
Technology requires too much technical support to fix glitches, thus taking away learning time		√√√√		√√	
Technology enables learners to take pride in their work		√√√√		√	√
Technology helps to catch and hold learners' attention		√		√√	√√
Technology is a distraction for learners			√√	√√	√
Technology promotes communication skills (e.g., writing and presenting)		√	√√	√√	
Technology increases safety risks unnecessarily (e.g., cyberbullying, identity theft, access to pornography)			√√√	√√	
Technology causes behaviour problems in the classroom		√√	√√	√√	
Technology motivates boys to engage in learning more so than girls	√√	√	√√√		

Table 11: Opinions regarding proposed technological developments

Respondent	Opinion
TQ 1	I would need to change/adapt/reflect and that is often a good thing. Students might become less resourceful. At least I don't think they are always as resourceful as they need to be – not sure that tech can help.
TQ 2	It would suit me and definitely my students, but I am concerned about the majority of my colleagues' ability to engage with technology (willingness) and also whether we have the infrastructure (network and bandwidth) to deal with the greater demand.
TQ 3	Teaching and learning would speed up. Content would be covered quicker. Skills developed faster.
TQ 4	It could have many possible advantages if it is implemented correctly. Unfortunately most schools do not have the right structures in place to make implementation successful.
TQ 5	Full discussion far too long and far too complicated in this space.

Respondent	Opinion
TQ 6	I think it allows teachers to be more imaginative and creative in their delivery, but I find my classes are distracted easily by the iPads on their desks. They often switch between the given task and social media. Especially with Math and Science the apps are not good enough to replace working with pen and paper.